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U.S. Army Environmental Center

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Evaluation of DERA Funded HAZMIN Projects, 1988-1991

Final Report
Volume 3 (Appendix E)

Submitted to:

U.S. Army Environmental Center (USAEC),
Aberdeen Proving Ground,
Maryland

January 31, 1994

Arthur D. Little, Inc.
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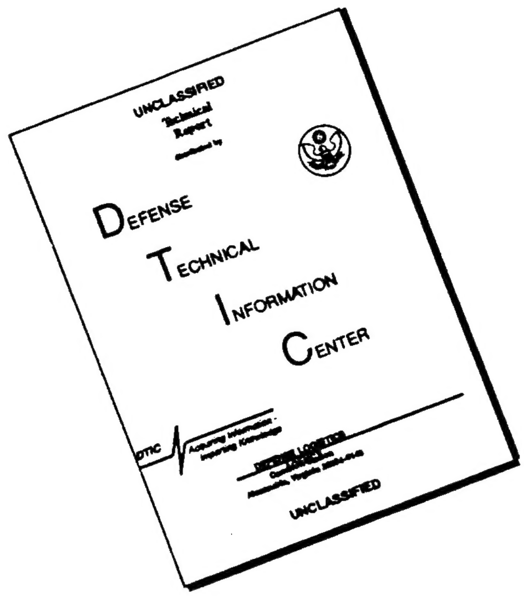

Appendix E: Available Documentation and Supplemental Information

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Table E-1: List of Supplemental Literature

Project Number	Organization/ MACOM	Brief Project Title	Installation/ Performer
12	AMC	Activate Pilot Plant for Recovery of STB	Pine Bluff Ars
	AMC	Pollution Prevention through Quality Improvement	Pine Bluff Ars
20	AMC	Reclamation of Cr from Plating Baths	Corpus Christi AD
21	AMC	AIVD Equipment/Support	Corpus Christi AD
23	AMC	Solvent Distillation Systems	Red River AD
	AMC	Hazardous Waste Minimization Incentive Awards Program	Red River AD
28	AMC	LP/HV Paint Spray Systems	Tobyhanna AD
29	AMC	Paint Sludge/Walnut Dust Incineration	Tooele AD
46	FORSCOM	Waste Oil Vacuum Truck	Ft. AP Hill
54	FORSCOM	Sediment and Soil Drying Beds	Ft. Polk
58	USACE	Development of Econ Analysis Model	CERL
59	USACE	Hazardous Mat'l Tracking System	CERL
60	USACE	Intra-Government Personnel Act	CERL
61	USACE	Software Conversion for Comp w/AAEMIS	CERL
62	USACE	Integrated Hazardous Material Plan	CERL
63	USACE	Env Analy/Tech Assess/Database Dev	DOE/ANL
66	HSC	Preparation of MDI and Update	AEHA
67	HSC	Laboratory Solvent Recycling	Fitzsimmons AMC
70	NGB	Purchase/Install PMB Equipment	AV MSARNG
72	TRADOC	Fuel Tank Purge Study	Ft. Eustis
73	TRADOC	Oil Vacuum Truck	Ft. Eustis

Source: Arthur D. Little, Inc. and Army Documentation

AMC
Pine Bluff Ars

The following literature is in reference to:

Project #	Project Title
12	Activate Pilot Plant for Recovery of STB
	Pollution Prevention through Quality Improvement

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#12

DEPARTMENT OF THE ARMY
PINE BLUFF ARSENAL
PINE BLUFF, ARKANSAS 71602-9500

REPLY TO
ATTENTION OF

SMCPB-ETP 23 July 1991

MEMORANDUM THRU: Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-ISE, Rock Island, IL 61299-6000

TO: Commander, U.S. Army Material Command, ATTN: AMCEN-A/Major Von Szilassy, 5001 Eisenhower Avenue, Alexandria, VA 22333-0001

SUBJECT: STB Rejuvenation Economic Analysis

1. Reference phone conversation between Major Von Szilassy, Mr. James C. Ellis, and Mr. James F. Hayley, dated 23 April 1991.

2. Here is the current economic analysis for the STB rejuvenation project at Pine Bluff Arsenal.

3. The POC is James F. Hayley, EIT, SMCPB-ETP, Engineering and Technology, DSN 966-2951.

FOR THE COMMANDER:

Will C. Bradford
Will C. Bradford
Director, Engineering &
Technology

SMCPB-ETP
SUBJECT: STB Rejuvenation Economic Analysis

23 July 1991

MFR:

ACTION OFFICER: James F. Hayley
James F. Hayley, SMCPB-ETP

CONCUR: E. Esmaeilpour
Emami E. Esmaeilpour, CH, P/MED

CONCUR: James C. Ellis
James C. Ellis, CH, PBS&AD

ECONOMIC ANALYSIS FORMAT A-1

1. Submitting Organization: Pine Bluff Arsenal

2. Date of Submission: 10 July 1991

3. Project Title: Decontaminating Agent, STB Rejuvenation

4. Description of Project Objective: Take out-of-spec. STB that is already in stock and marked for hazardous waste landfill and rejuvenate by adding more chlorine through a chemical process. This STB will come from the Army and DLA and once rejuvenated will be returned to the originator to maintain STB quantities on hand. The final state of the STB will be IAW Mil-D-12468.

5. a. Present Alternative: Continue buying STB from a foreign, overseas supplier and buying hazardous waste landfill space to hold out of spec STB.

5. b. Proposed Alternative: Fund this project to rejuvenate STB thereby drastically reducing the amount of "new" STB bought each year and eliminating the requirement of a hazardous waste landfill.

6. a. Economic Life: Present Alterantive: 11 years

b. Economic Life: Proposed Alternative: 11 years

7. Proj Year	8. Recurring (Opns) Costs a. Present Alternative	b. Proposed Alternative	9. Differential Cost	10. Discount Factor	11. Present Value Diff. Cost
1.	1,445,000	1,445,000	0	0.954	0
2.	1,445,000	1,009,800	435,200	0.867	377,318.
3.	1,445,000	1,009,800	435,200	0.788	342,938.
4.	1,445,000	1,009,800	435,200	0.717	312,038.
5.	1,445,000	1,009,800	435,200	0.652	283,750.
6.	1,445,000	1,009,800	435,200	0.592	257,638.
7.	1,445,000	1,009,800	435,200	0.538	234,138.
8.	1,445,000	1,009,800	435,200	0.489	212,813.
9.	1,455,000	1,009,800	435,200	0.445	193,664.
10.	1,445,000	1,009,800	435,200	0.405	176,256.
11.	1,445,000	1,009,800	435,200	0.368	160,154.
TOTALS	4,352,000	0	4,352,000		2,550,707

ECONOMIC ANALYSIS FORMAT A-1, page 2 of 3

12. Present Value of New Investment:

Project Year	Proposed Investment	Discount Factor	Discounted Investment Cost
1.	1,500,000	0.954	$1,431,000
2.	0	0.867	0
3.	0	0.788	0
4.	0	0.717	0
TOTALS	1,500,000		$1,431,000

13. Total Present Value of New Investment: 1,431,000

14. Less: Value of Existing Assets Replaced: 0

15. Less: Discounted Terminal Value of New : Investment: 0

16. Total New Present Value of Investment: 1,431,000

17. Present Value of Cost Savings from : Operations (Col 11): 2,550,707

18. Plus: Present Value of the Cost Refurbishment or Modifications Eliminated (Cost Avoidance): 0

19. Total Present Value of Savings: 2,550,707

20. Savings/Investment Ratio: 1.782

21. Rate of Return on Investment: 26%

ECONOMIC ANALYSIS FORMAT A-1, page 3 of 3

22. Source/Derivation of Cost Estimates: STB disposal and salvage.
Source: Dr. John Frick, DLA, DSN 284-7541

Based upon historical data, we have used an average of 765,026 lbs of STB each year for the last 3 years at $1.78 pounds. We had to purchase 765,026 pounds and land fill 502,000 pounds at a cost of $.18 per pound. An average of 263,026 pounds was salvaged each year, thus reducing our total cost by $7,085.

1,361,746	Purchase of 765,026 pounds @ $1.78
90,360	Landfill 502,000 @ $.18
(7,085)	Salvage 263,026 @ .027
$ 1,445,021	

To remanufacture: 765,026 pounds (average usage) would require:

$1,009,834	Rejuvenate 765,026 @ $.132

1,445,000
1,009,800
435,200

23. Name & Title of Principal Action Officer: James F. Hayley, E&T, DSN 966-2951, SMCPB-ETP, Engineering and Technology, Pine Bluff Arsenal, Pine Bluff, AR 71602-9500

PINE BLUFF ARSENAL
--------VALIDATED--------
CONTROL NO. 91-10 LEVEL NO. II
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VALIDATOR: [signature] APPROVER: ______
VOID AFTER: 10 Jun 92
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#12

Pollution Prevention
Through Quality Improvement
At Pine Bluff Arsenal's White Smoke Production Facility

A Total Quality Management approach to reducing hexachloroethane hazardous wastes by process improvement.

Proposal and Request for Funding

Charlie Neel & Phillip Vick
Directorate for Environmental and Natural Resources Management
Pine Bluff Arsenal

December 22, 1992

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TABLES

APPENDICES

Pollution Prevention Through Quality Improvement At Pine Bluff Arsenal's White Smoke Production Facility

I. Executive Summary. Over the last several years, Pine Bluff Arsenal has operated a white smoke mix production facility. This facility produces the pyrotechnic smoke mix needed for the M8 HC Smoke Grenade and the M4 and M5 HC Smoke Pots. The mix process was designed at a time when producing quality munitions was paramount; little regard was given to the amount of waste produced. Today, the disposal and handling costs of the hazardous waste generated at this line are becoming overwhelming. Hexachloroethane (HC or hex), one of the key ingredients of the smoke mix has been added to the Environmental Protection Agency's list of toxic constituents. A waste that contains greater than 3 parts per million leachable hexachloroethane is now a characteristic hazardous waste.

Between the years 1985 and 1991, more than ten percent of the raw material used to produce white smoke became waste; 1667.3 tons of mix were produced and 176.8 tons of hazardous waste were generated. Contributing to the rate of waste generation is the amount of rework required to produce a quality batch of mix. On average, during the same years, each batch of mix had to be blended 3.4 times to meet the burn time specifications of the mix. If averaged over this same time period, over $136,699 per year was spent on the cost of rework and waste generation. This document is a proposed scope of work and request for funding in the amount of $298,463 to study the white smoke manufacturing process and make recommendations for pollution prevention and quality improvement.

II. Introduction.

A. Hexachloroethane Based White Smokes. Hexachloroethane based white smokes have been used by the Army for many years. There have been efforts to replace hexachloroethane based smokes with a less toxic, non-carcinogenic substitute and much of the development work is taking place at Pine Bluff Arsenal. The replacement, a terephthalic acid or TA based smoke, is generally considered inferior to hexachloroethane based smokes. Pound for pound, TA mix can not produce as much smoke as hexachloroethane mix. During the years preceding and during the development, little work was initiated to improve the hexachloroethane mix process because it was thought that the Army was going to phase out hexachloroethane based smoke munitions altogether. It is now understood that TA based munitions will be used for training purposes because they are less toxic and non-carcinogenic, but will not fully replace hexachloroethane munitions. Pine Bluff Arsenal continues to receive orders for M8 HC Grenades. Environmental regulation of wastes and pollution continue to increase and become more stringent; the Arsenal can not continue producing hexachloroethane mix as we do now without a program for continual process improvement and pollution prevention.

B. The HC Mix Process. The pyrotechnic mixture is composed of three ingredients, hexachloroethane, zinc oxide, and aluminum in the approximate ratio of 46:45:9, respectively. The hexachloroethane and zinc oxide are shipped to Pine Bluff Arsenal in paper bags. The bags are loaded into bag shredders where the material is removed from the bags, the zinc oxide is ground and the ingredients are conveyed to a transport tank. From the transport tank, the materials are pneumatically conveyed to a Jet-Air Blender. Aluminum is added and the ingredients are blended with pulses of air.

The smoke mix is then unloaded from the blenders and samples are taken to make sample grenades. The grenades are burned as a quality check on the burn time of the mix. The quality of the burn time is judged in accordance with Mil-Std-414. The lower and upper specification limits on burn time are 95 and 125 seconds, respectively. The maximum percent defective varies depending on the number of samples but is typically around five percent. When the burn time specifications are not met, the mix must be reblended. If the burn time is too short, more aluminum is added; if the burn time is too long, hexachloroethane and zinc oxide are added. Hazardous wastes are generated in a number of places in the process, and while accurate records are kept of the total amount of waste produced, little or no records are kept on each individual step in the hexachloroethane mix process.

III. The Problem. Prior to 1990, hexachloroethane was not defined as hazardous waste. But in 1990, EPA added hexachloroethane to the list of characteristic wastes. On March 29, 1990, wastes containing 3 mg/l (ppm) of leachable hexachloroethane was added to the list of characteristic hazardous wastes. Perhaps more importantly, drums of HC smoke mix are prone to bulging as a result of pressure build-up in the drums creating handling and safety problems.

IV. Requirements for Pollution Prevention Projects.

A. Pollution Prevention Regulations. Although there is a large potential for cost savings, there are legal requirements for pollution prevention projects and failure to develop and study source reduction opportunities could result in a notice of violation and eventually fines. It is DOD policy to implement pollution prevention projects but there are also federal and state requirements. These requirements can be found on each Uniform Hazardous Waste Manifest, in the Pollution Prevention Act of 1990 and in the Arsenal's RCRA Permit for Hazardous Waste Storage.

1. Uniform Hazardous Waste Manifest. Each manifested shipment of hazardous waste leaving the Arsenal contains the following certification: "If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford."

2. Pollution Prevention Act of 1990. The Pollution Prevention Act of 1990 mandates pollution prevention and establishes a National policy of source reduction. The Act stipulates that EPA take steps to establish a nation-wide source reduction program and develop a strategy for quantifying source reduction.

3. RCRA Permit Mandated Pollution Prevention. On September 24, 1992, Pine Bluff Arsenal was notified that EPA and the Arkansas Department of Pollution Control and Ecology (ADPC&E) had made a tentative decision to issue a final RCRA Part B Permit for the interim status hazardous waste storage units at Pine Bluff Arsenal. The draft permit for these facilities requires a hazardous waste minimization program be in place to reduce the volume and toxicity of all hazardous wastes which are generated. The draft permit also requires submission of an annual report that details:

a. Any written policy or statements that outline goals, objectives, and/or methods for source reduction and recycling of hazardous waste;

b. Any employee training or incentive programs designed to identify and implement source reduction and recycling opportunities;

c. Any source reduction and/or recycling measures implemented in the last five years or planned for the near future;

d. An itemized list of the dollar amounts of capital expenditures (plant and equipment) and operating costs devoted to source reduction and recycling of hazardous waste;

e. Factors that have prevented implementation of source reduction and/or recycling;

f. Sources of information on source reduction and/or recycling received.

g. An investigation of additional waste minimization efforts which could be implemented at the facility. This investigation shall analyze the potential for reducing the quantity and toxicity of each waste stream through production reformulation, recycling, and all other appropriate means. The analysis shall include an assessment of the technical feasibility, cost, and potential waste reduction for each option;

h. Submission of a flow chart or matrix detailing all hazardous waste produced by quantity and type and by building/area; and

i. A demonstration of the need to use those processes which could produce a particular hazardous waste due to a lack of alternative processes that would produce less toxic waste.

V. Historical Generation of Hexachloroethane Hazardous Waste. The waste generated at Building 34-640, the HC Mix Production Building, is outlined in Table 1, below. The figures are considered to be approximate year by year because the date waste is turned-in may lag behind the actual production date. In addition, some material may have been held for rework and then turned in as waste. As can be seen by the totals presented at the bottom of the chart, more than 10% of the mix produced became hazardous waste.

Table 1: Historical hazardous waste production rate.

YEAR	MIX PRODUCED (tons)	HW PRODUCED (tons)	% OF MIX TO WASTE
1985	0	2.5	n/a
1986	481.6	0	0
1987	0	7.2	1.5
1988	410.6	21.8	5.3
1989	322.5	64.1	19.9
1990	260.2	59.0	22.7
1991	0	0.5	n/a
1992	192.4	21.7	11.3
Total	1667.3	176.8	10.6

VI. Historical Batch Rework of Mix. The historical reblend rate of batches is presented in the table below. Records for as far back as available were reviewed to obtain the production and reblend rates. These numbers should be considered to be approximate but the totals at the bottom should be close. No real trends can be surmised from the data. The reblend rate has never been below two and the average over the eight year for which data has been kept is 3.4.

Table 2: Historical reblend rate of batches.

YEAR	BATCHES PRODUCED	TOTAL BLENDS	NUMBER OF BLENDS PER BATCH
1985	0	0	0
1986	488	1074	2.4
1987	0	0	0
1988	382	1389	3.6
1989	300	1855	6.2
1990	242	505	2.1
1991	0	0	0
1992	157	528	3.4
Total	1569	5351	3.4

VII. The Link Between Rework and Waste Generation. A number of waste generation sources are within the rework loop of the HC process. Each time a batch of mix is reworked, more waste is generated. Reworking a batch of mix effectively returns the raw materials to the beginning of the mix process where the formulation is adjusted by adding aluminum or premix (zinc oxide and hexachloroethane). There are some raw material processing steps that generate wastes that are not required for reblending but for those sources of waste in the rework loop, if a batch is blended twice rather than once, the quantity of waste is doubled.

VIII. The Cost of Quality. Table 3, below, lists the costs of producing a batch of HC mix as the process now operates and without the additional cost of reblending or waste generation. Based on production standards or averages, a batch of mix costs approximately $2,418 to produce. Approximately 29% of this cost is directly attributable to reblending and to the cost of purchasing and disposing of material that becomes hazardous waste. This estimate is considered to be conservative. If the 1992 production records are used to calculate the cost per batch, the cost jumps above $2,500 per batch.

The cost of producing a batch that does not require reblending is $1,721. A total of $697 is spent on wasted labor and materials. This project will not cut this figure to zero; it is expected that some waste and some reblending will always be necessary but gaining control of the process, the objective of this proposal should be able to cut both the waste generation and reblending in half and therefore the associated costs. A summary of the differential costs for economic analysis is contained in Appendix A.

Table 3: Batch Costs with and without waste and rework.

Cost per batch	With waste and reblends	Without waste and reblends
1. Raw Materials	$1,800.00	$1,633.00
2. Labor		
a. Preparation of mix	$66.00	$66.00
b. Quality sampling	$76.00	$22.00
c. Reblending	$226.00	$0.00
3. Waste Disposal	$250.00	$0.00
COST PER BATCH	$2,418.00	$1,721.00

IX. Proposed Scope of Work.

A. Preparation of a Baseline Process Flow Diagram. The base line flow diagram for the process is an important tool for judging any improvement in the quality or to determining if less hazardous waste is generated. The baseline will include a general flow diagram of the materials, showing all sources of pollution including, waste water, solid waste,

and air emissions. Each pertinent step of the operation including quality control steps and the equipment used will be presented.

B. Analysis of Quality Information from Past Production. Data such as burn time, composition, material lots, percent moisture on acceptable batches, amount of aluminum or premix added to bring burn time into an acceptable range is continually collected but this information has not been plotted or evaluated mathematically or statistically. As part of this scope of work, a subset of this data taken during the 1992 production run will be entered into a computer spread sheet and evaluated. Such things as average burn time versus the percent composition will be plotted and evaluated.

C. Augmentation of Quality Information during the Next Production Run. During the next production run, as an augmentation to the quality information that is normally taken during a production run, several additional parameters will be monitored to determine the parameter's affect on burn time. On a subset of the production blends during the next M8 buy, perhaps only first blends, data will be gathered to determine the variability of the raw materials and the capability of the process. The data that will be monitored includes the particle size distribution of each of the raw materials, the percent moisture of each of the raw materials, and an analysis of the mix. These data will be evaluated in a fashion similar to the data collected from previous runs, however the data set will be more reliable and complete.

D. Experimental Work.

1. Analysis of Burn Time Variability.

a. Sampling and Grenade Preparations. The variability introduced by the sampling procedure will be evaluated by preparing batches of mix in the Arsenal's Production Engineering Laboratory. Preparing the mix in the laboratory will eliminate the variability of the mix process. The raw material will come from the same lot and same bag of material and mixed with care to assure homogeneity of the mix. Grenades will be prepared and burned as per the normal quality testing procedure except during these tests, two quality personnel will independently evaluate the burn time of each grenade to evaluate the variability introduced by the subjectivity of the testers.

b. Chemical and Physical Characteristics of the Raw Materials. If the variability of the sampling and testing is within reason, then the study can proceed to evaluation of the variability caused by the chemical and physical properties of the raw materials. This will be completed by using experiments designed around an orthogonal array. This technique for design of experiments is discussed in Genichi Taguchi's System of Experimental Design. Through an evaluation of the raw materials, the chemistry of the grenade, and discussions with process personnel, the physical and chemical properties of the raw materials that may be contributing to burn time variation were listed and narrowed down to those which are the most important and have the most variation in and of themselves. Those factors are the composition of the mix, the particle size distributions of each raw material, and the percent moisture of the mix.

These factors will be used to create an L_8 Orthogonal Array to maximize the efficiency of the experiments. Using this technique, the individual effects of all seven factors can evaluated in only eight experiments. Each factor will be evaluated at two levels. If the technical data package has an upper and lower specification limit for the factor, one level will be set at the upper specification limit and the other will be set at the lower specification limit. The effect of changing each of the variables will be evaluated using the average burn time, standard deviation, and percent defective. The array will be set up as shown in the table below.

Table 4: Orthogonal Array.

Experiment Number	Factor						
	A	B	C	D	E	F	G
1	1	1	1	1	1	1	1
2	1	1	1	2	2	2	2
3	1	2	2	1	1	2	2
4	1	2	2	2	2	1	1
5	2	1	2	1	2	1	2
6	2	1	2	2	1	2	1
7	2	2	1	1	2	2	1
8	2	2	1	2	1	1	2

Where for example,

Factor A is percent aluminum,
Factor B is percent hexachloroethane,
Factor C is percent zinc oxide,
Factor D is the particle size distribution of the aluminum,
Factor E is the particle size distribution of the hexachloroethane,
Factor F is the particle size distribution of the zinc oxide, and
Factor G is the percent moisture of the mix.

The ones and twos in the body of the array represent the two levels at which each factor will be evaluated. For example, the first experiment will be conducted with all factors set at level one. The second experiment will be conducted with Factors A, B, and C set at the first level and Factors D, E, F, and G set at the second level. Grenades will be prepared for each of the eight mixes and burned to determine the average burn time, standard deviation, and percent defective.

Each factor (i.e. each column of the orthogonal array) is then considered. The percent defective (or burn time or deviation) for the four experiments is totalled for the experiments with Factor A at Level 1 to determine the total percent defective over the four experiments. The numbers may be averaged if desired. The percent defective are also totalled for the four experiments with Factor A at Level 2. This number is compared to the first and, if

minimization of the percent defective is the goal, the level of Factor A yielding the lowest percent defective is the level of choice. Note that the variance in percent defective due to changes in the other factors cancel each other out. This is true when each column or factor in the orthogonal array is evaluated. Readers unfamiliar with this method are referred to the previously mentioned citation.

There are two objectives to this type of experimentation. The first is to rank the individual factors from those that affect burn time the most to those that affect burn time the least. Variability in the most important factors will cause the most problems with the mix. Once the variability of each factor is quantified and ranked, the first objective is to eliminate it. This may necessitate a change or addendum to the mil spec for the material or possibly just a change in the class of the materials purchased. If the variation can not be eliminated, then the other option is to control the process based on the variation of the factor.

Given an understanding of how an uncontrollable factor affects the process, changes can be made in a controllable factor to compensate. This concept, although it seems foreign to pyrotechnics manufacturing, is common to the chemical manufacturing industry, particularly for batch processes and is known as feed-forward control. The information needed for feed-forward control will come from the experiments mentioned above and from continued monitoring of the process itself. Feed-forward control depends on a mathematical model for the process. Since the actual relationship between burn time and all of the factors that influence burn time is not known and is probably too complicated to be of use, the model can be approximated by the following expression:

$$y = \beta_0 x_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_{k-1} x_{k-1}$$

where,

y = burn time,
x_k = measurements of the factors that affect burn time, and
β_k = constants.

This approximation is justified on grounds that there will be very limited ranges for the values of x_k. For those factors which have a relatively large influence on burn time, the military specification should ensure that this is the case. The problem becomes one of estimating the coefficients, β_k. This can be done by a least-squares method of the type described in texts such as the National Bureau of Standards Handbook 91, Experimental Statistics which was previously printed as the U.S. Army Ordnance Pamphlet ORP 20-110. The general procedure follows.

The data to be analyzed consists of n points which may be represented as (x_{01}, x_{11}, . . . , $x_{k-1,1}$, Y_1) through (x_{0n}, x_{1n}, . . . , $x_{k-1,n}$, Y_n). Each point or observation is a set of raw material characteristics (x_0 through x_{k-1}) and the resultant burn time (Y_n). The number of observations (n) must be greater than the number of factors (k). The observational data can be represented in matrix form by

$$\begin{vmatrix} x_{01} & x_{11} & x_{21} & \cdots & x_{k-1,1} & Y_1 \\ x_{02} & x_{12} & x_{22} & \cdots & x_{k-1,2} & Y_2 \\ \cdot & & & & \cdot & \\ \cdot & & & & \cdot & \\ \cdot & & & & \cdot & \\ x_{0n} & x_{1n} & x_{2n} & \cdots & x_{k-1,n} & Y_n \end{vmatrix}$$

The first step of this process is the formation of normal equations from the sums of squares and cross products as follows:

$$\beta_0 \Sigma x_0^2 + \beta_1 \Sigma x_0 x_1 + \ldots + \beta_{k-1} \Sigma x_0 x_{k-1} = \Sigma x_0 Y$$
$$\beta_0 \Sigma x_1 x_0 + \beta_1 \Sigma x_1^2 + \ldots + \beta_{k-1} \Sigma x_1 x_{k-1} = \Sigma x_1 Y$$
$$\ldots$$
$$\beta_0 \Sigma x_{k-1} x_0 + \beta_1 \Sigma x_{k-1} x_1 + \ldots + \beta_{k-1} \Sigma x_{k-1}^2 = \Sigma x_{k-1} Y$$

or in matrix form

$$X'X\hat{\beta} = X'Y = Q$$

where

$$Q' = (q_1, q_2, \ldots, q_r),$$

and

$$q_i = \sum_{i=1}^{n} x_{ij} Y_i, (j = 0, 1, \ldots, k-1).$$

The normal equations can then be solved for the $ß_k$'s which can be expressed as

$$
\begin{aligned}
\hat{\beta}_0 &= c_{00}q_0 + c_{01}q_1 + \ldots + c_{0,k-1}q_{k-1} \\
\hat{\beta}_1 &= c_{10}q_0 + c_{11}q_1 + \ldots + c_{1,k-1}q_{k-1} \\
&\ldots \\
\hat{\beta}_{k-1} &= c_{k-1,0}q_0 + c_{k-1,1}q_1 + \ldots + c_{k-1,k-1}q_{k-1}
\end{aligned}
$$

The next step is to invert the matrix of normal equations in order to solve for the c terms. In matrix notation

$$
(X'X)^{-1} = \begin{vmatrix} c_{00} & c_{01} & \cdots & c_{0,k-1} \\ c_{10} & c_{11} & \cdots & c_{1,k-1} \\ \cdots & & & \\ c_{k-1,0} & c_{k-1,1} & \cdots & c_{k-1,k-1} \end{vmatrix}
$$

The matrix of the normal equations can quickly and easily be inverted by computer programs such as Lotus 123 and once the $ß_k$'s are solved for, they can be substituted into the burn time model to predict how changes in the raw materials will affect the burn time and can be used to calculate how the composition of the mix should modified to achieve the correct burn time.

be

c. Mixing Procedure. The third area of the process that must be evaluated is the blending process which will be evaluated in a fashion similar to the raw material factors. The first step will be to list all factors that may influence the mixing. These factors will be varied in accordance with the Taguchi method for design of experiments during actual production runs on strictly new blends. Factors such as the amount of material, number of air pulses, time between pulses, quantity of air, and air pressure/velocity are on the list to be evaluated. None of the factors will be changed drastically from present operations; they will be varied only enough to determine the factor's affect on the blending. The experimental results will be based on the standard deviation in the sample burn times rather than on the average burn times or the percent defective.

X. Funding Requirements. The funding required in order to complete this project is outlined in Table 5. The labor required to complete the Burn Time Test Evaluation includes enough time to prepare four laboratory scale batches of HC Smoke mix. The second phase of work, the Raw Material Study includes enough time to complete the recommended design of experiments three times for a total 24 laboratory scale batches of mix. The last phase, optimization of the blender, will take place during a production run on production size batches so much of the work that will be completed during this phase will be a part of the cost of production.

Table 5: Cost Breakdown of Project.

Organization	People	Weeks	Hours/ Person	Task	Cost/hr	Cost
I. Burn Time Test Evaluation.						
SMCPB-EME	1	1	40	Planning	$52.59	$2,103.60
SMCPB-ETT	1	1	40	Planning	$74.95	$2,998.00
SMCPB-ETT	4	2	80	Mix Preparation	$74.95	$23,984.00
SMCPB-MO	4	1	40	Grenade Preparation	$59.88	$9,580.80
SMCPB-MOQ	3	1	40	Grenade Burning	$63.90	$7,668.00
SMCPB-EME	1	1	40	Data Evaluation	$52.59	$2,103.60
SMCPB-PA	1	1	40	Material Testing	$64.60	$2,584.00
Materials						$1,000.00
Subtotal						$52,022.00
II. Effect of Raw Material Chemical and Physical Properties on Burn Time.						
SMCPB-EME	1	3	120	Planning	$52.59	$6,310.80
SMCPB-ETT	1	3	120	Planning	$74.95	$8,994.00
SMCPB-ETT	4	10	400	Mix Preparation	$74.95	$119,920.00
SMCPB-MO	4	6	240	Grenade Preparation	$59.88	$57,484.80
SMCPB-MOQ	3	3	120	Grenade Burning	$63.90	$23,004.00
SMCPB-EME	1	1	40	Data Evaluation	$52.59	$2,103.60
SMCPB-PA	1	2	80	Material Testing	$64.60	$5,168.00
Materials						$1,000.00
Subtotal						$223,985.20
III. Blending Optimization.						
SMCPB-EME	1	1	40	Planning	$52.59	$2,103.60
SMCPB-ETT	1	0	0	Planning	$74.95	$0.00
SMCPB-ETT	4	0	0	Mix Preparation	$74.95	$0.00
SMCPB-MO	4	1	40	Grenade Preparation	$59.88	$9,580.80
SMCPB-MOQ	3	1	40	Grenade Burning	$63.90	$7,668.00
SMCPB-EME	1	1	40	Data Evaluation	$52.59	$2,103.60
SMCPB-PA	1	0	0	Material Testing	$64.60	$0.00
Materials						$1,000.00
Subtotal						$22,456.00
Total						$298,463.20

XI. Conclusions. The HC Smoke Mix Production Facility currently operates very inefficiently. An excess of ten percent above the required amount of raw material must be purchased only to end up as waste. Some batches must be reblended numerous times in order to meet burn time quality checks. This is built into the process; it is by design that this reblending takes place. Batches of mix are made without regard to the quality of the raw materials.

The objective of this project is to determine what qualities of the raw materials are most important to obtaining a burn time within specification limits. A relationship between the raw material factors and burn time will be developed so that if the characteristics of each raw material are known, the formulation of the mix can be adjusted based on a statistical burn time model.

The proposed scope of work will cost approximately $298,000 and if the project cuts waste and reblending in half $68,000 per year in cost savings will be generated. The present value of this savings over a ten year project life is $155,000 assuming a 10% interest rate. The saving/investment ratio is 1.56 and the rate of return on investment is 26%.

APPENDIX A

Summary of Differential Costs for Economic Analysis

SUMMARY OF DIFFERENTIAL COSTS FOR ECONOMIC ANALYSIS
FORMAT A-1

1. Submitting Organization: Pine Bluff Arsenal

2. Date of Submission: 23 December 92

3. Project Title: Pollution Prevention Through Quality Improvement At Pine Bluff Arsenal's White Smoke Production Facility

4. Description of Project Objective: To complete a study of the Hexachloroethane Mix Production Facility to reduce the amount of hazardous waste generated. The generation of waste is directly related to rework at the production line so a secondary benefit of this study will be cost savings. This objective will be achieved by the development of a statistical feed-forward control strategy and optimization of the blending process.

5a. Present Alternative: Continue blending of mix based on a trial and error method of meeting quality specifications (burn time) for the mix and continue blending without a full understanding of how different factors affect the blending process.

5b. Proposed Alternative: Complete a study in order to relate raw material factors to the burn time of the mix and then use this information to control the mix process in a feed forward manner. This includes the development of a statistical method for handling burn time and raw material information so that it can be used to control the burn time of the mix.

6. Economic Life: 10 years.

7. Project Year	8. Recurring Costs		9. Differential Costs	10. Discount Factor	11. Present Value
	a. Present Alternative	b. Proposed Alternative			
1	474,230.25	405,880.69	68,349.56	0.954	65,205.48
2	474,230.25	405,880.69	68,349.56	0.867	59,259.07
3	474,230.25	405,880.69	68,349.56	0.788	53,859.45
4	474,230.25	405,880.69	68,349.56	0.717	49,006.63
5	474,230.25	405,880.69	68,349.56	0.652	44,563.91
6	474,230.25	405,880.69	68,349.56	0.592	40,462.94
7	474,230.25	405,880.69	68,349.56	0.538	36,772.06
8	474,230.25	405,880.69	68,349.56	0.489	33,422.93
9	474,230.25	405,880.69	68,349.56	0.445	30,415.55
10	474,230.25	405,880.69	68,349.56	0.405	27,681.57
Totals	4,742,302.50	4,058,806.90	683,495.60		440,649.59

12. Value of new investment:	Present Value
a. Study results and burn time model: $298,463.20 x 0.954 =	$284,733.89
13. Total value of new investment:	$284,733.89
14. Plus: Value of existing assets to be employed on the program:	$0.00
15. Less: Value of existing assets replace:	$0.00
16. Less: Terminal value of new investment:	$0.00
17. Net value of new investment:	$284,733.89
18. Total differential costs (savings) from operations (total of col. 11):	$440,649.59
19. Plus: Value of the costs of refurbishment modifications eliminated:	$0.00
20. Total value of savings:	$440,649.59
21. Savings/investment ratio (20 divided by 17):	1.56
22. Rate of return on investment:	26%

23. Source/derivation of cost estimates:

a. Non-recurring costs:

Organization	People	Weeks	Hours/ Person	Task	Cost/hr	Cost
I. Burn Time Test Evaluation.						
SMCPB-EME	1	1	40	Planning	$52.59	$2,103.60
SMCPB-ETT	1	1	40	Planning	$74.95	$2,998.00
SMCPB-ETT	4	2	80	Mix Preparation	$74.95	$23,984.00
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SMCPB-ETT	4	10	400	Mix Preparation	$74.95	$119,920.00
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SMCPB-PA	1	2	80	Material Testing	$64.60	$5,168.00
Materials						$1,000.00
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SMCPB-EME	1	1	40	Planning	$52.59	$2,103.60
SMCPB-ETT	1	0	0	Planning	$74.95	$0.00
SMCPB-ETT	4	0	0	Mix Preparation	$74.95	$0.00
SMCPB-MO	4	1	40	Grenade Preparation	$59.88	$9,580.80
SMCPB-MOQ	3	1	40	Grenade Burning	$63.90	$7,668.00
SMCPB-EME	1	1	40	Data Evaluation	$52.59	$2,103.60
SMCPB-PA	1	0	0	Material Testing	$64.60	$0.00
Materials						$1,000.00
Subtotal						$22,456.00
Total						$298,463.20

b. Recurring Costs:

Recurring costs of present production method (as taken from production standards):

Cost per batch:

1. Raw Materials:	$1800.00
2. Labor:	
a. Preparation of mix	$66.00
b. Quality sampling	$76.00
c. Reblending	$226.00
3. Waste Disposal:	$250.00
Total Cost Per Batch:	$2418.00

Note: As calculated from production records, the cost per batch for the 1992 production run was greater than $2500.00. The value above ($2418), based on production standards or averages, is considered conservative.

Cost per year:

Between 1985 and 1992, 1,569 batches of mix were produced. This averages out to 196.125 batches per year. Between 1985 and 1992, there were three years during which no mix was produced. Because this may representative of the ten years of the project life, these years were included in the calculation of the number of batches per year.

196.125 batches/year x $2,418.00/batch = $474,230.25/year

Recurring costs of proposed production method:

Cost per batch:

1. Raw Materials:	$1633.00
2. Labor:	
a. Preparation of mix	$66.00
b. Quality sampling	$22.00
c. Reblending	$0.00
3. Waste Disposal:	$0.00
Total Cost Per Batch:	$1721.00

Cost per year:

196.125 batches/year x $1721.00/batch =	$337,531.125

This is the cost of producing mix without the generation of hazardous waste and reblending. It will not be possible to reduce this waste to zero and it is conservatively estimated that the study and work proposed here will cut the cost of waste and rework in half or by 50%.

Max potential savings/year = $474,230.25 - $337,531.125 = $136,699.13

It is assumed that 50% of the potential will be achieved or $68,349.56/year.

Therefore the cost per year under the proposed method will be $405,880.69/year.

APPENDIX B

Summary of Benefits/Outputs for Economic Analysis

SUMMARY OF BENEFITS/OUTPUTS FOR ECONOMIC ANALYSIS
FORMAT B

1. Submitting Organization: Pine Bluff Arsenal

2. Date of Submission: 23 December 1992

3. Project Title: Pollution Prevention Though Quality Improvement At Pine Bluff Arsenal's White Smoke Production Facility

4. Description of Project Objective: To complete a study of the Hexachlorethane Mix Production Facility to reduce the amount of hazardous waste generated. The amount of waste generated is directly related to the amount of rework at the production line. A secondary benefit of this study will be a reduction in rework at the line. This objective will be achieved by the development of a statistical feed-forward control strategy and optimization of the blending process.

5. Alternatives:

a. Continue to manufacture smoke mix using the present method.

b. Complete the study proposed here to develop a feed-forward control strategy and optimize the blending system.

6. Economic life: 10 years.

7. Benefit/Output Analysis:

At Pine Bluff Arsenal, the Hexachloroethane Mix Production Facility is one of the largest sources of hazardous waste. The process, which was designed prior to the listing of hexachloroethane as a hazardous waste, uses an accept/reject quality check process. The mix has to be made to stringent burn time requirements and if these requirements are not met, the mix is reworked. Historical records indicate a rework rate of 240%. The process of reworking the mix contributes to the waste generation rate. It is felt that a feed-forward control strategy could reduce the rework and waste generation by as much as 50% but in order implement such a strategy, the development work described here must be completed.

The quantifiable benefits of this project are outlined in the preceding Format A-1; however, there are specific regulatory requirements for pollution prevention and failure to develop and study source reduction opportunities could result in a notice of violation and eventually fines. It is DOD policy to implement pollution prevention projects but there are also federal and state requirements. These requirements can be found on each Uniform Hazardous Waste Manifest, in the Pollution Prevention Act of 1990 and in the Arsenal's RCRA Permit for hazardous waste storage.

1. Uniform Hazardous Waste Manifest. Each manifested shipment of hazardous waste leaving the Arsenal contains the following certification: "If I am a large quantity generator [the Arsenal is a large quantity generator], I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford."

2. Pollution Prevention Act of 1990. The Pollution Prevention Act of 1990 mandates pollution prevention and establishes a National policy of source reduction. The Act stipulates that EPA take steps to establish a nation-wide source reduction program and develop a strategy for quantifying source reduction.

3. RCRA Permit Mandated Pollution Prevention. On September 24, 1992, Pine Bluff Arsenal was notified that EPA and the Arkansas Department of Pollution Control and Ecology had made a tentative decision to issue a final RCRA Part B Permit for the interim status hazardous waste storage units at Pine Bluff Arsenal. The draft permit for these facilities requires a hazardous waste minimization program be in place to reduce the volume and toxicity of all hazardous wastes which are generated. The draft permit also requires submission of an annual report that details:

a. Any written policy or statements that outline goals, objectives, and/or methods for source reduction and recycling of hazardous waste;

b. Any employee training or incentive programs designed to identify and implement source reduction and recycling opportunities;

c. Any source reduction and/or recycling measures implemented in the last five years or planned for the near future;

d. An itemized list of the dollar amounts of capital expenditures (plant and equipment) and operating costs devoted to source reduction and/or recycling;

e. Factors that have prevented implementation of source reduction and/or recycling;

f. Sources of information on source reduction and/or recycling received;

g. An investigation of additional waste minimization efforts which could be implemented at the facility. This investigation shall analyze the potential for reducing the quantity and toxicity of each waste stream through product reformulation, recycling, and all other appropriate means. The analysis shall include an assessment of the technical feasibility, cost, and potential waste reduction or each option;

h. Submission of a flow chart or matrix detailing all hazardous waste produced by quantity and type and by building/area; and

i. A demonstration of the need to use those processes which could produce a particular hazardous waste due to a lack of alternative processes that would produce less toxic waste.

RECOMMENDATION:

Based on the information presented here and in the Format A-1, the study should be funded and completed as proposed. Rarely does compliance with environmental regulations prove to be cost effective, at least in the short term. In this instance, the project has the potential to (1) pay for itself and generate additional savings, (2) reduce the amount of hazardous waste generated and therefore the "cradle to grave" responsibility for its generation, and (3) meets the requirement of pollution prevention mandated by DOD policy, and state and Federal regulations.

8. Source and derivation of benefit data:

a. Pollution Prevention Act of 1990.

b. Draft RCRA Part B Permit 19-H, Sep 24, 1992.

c. Pine Bluff Arsenal personnel including Quality, Manufacturing, Environmental and Engineering personnel.

9. Name and title of principal action officer:

Charlie E. Neel

12-23-92

Mr. Charlie E. Neel, Chemical Engineer, Directorate for Environmental and Natural Resources Management, Pine Bluff Arsenal

Date

Telephone: Comm: 501-540-2804 AV: 966-2804

10. Name and title of approving authority:

Mr. Wendell L. Fortner, Director, Directorate for Environmental and Natural Resources Management, Pine Bluff Arsenal

Date

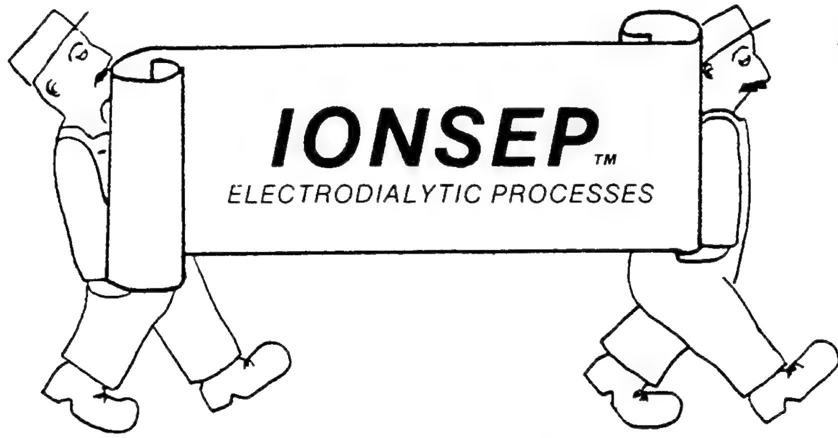
Telephone: Comm: 501-540-2800 AV: 966-2800

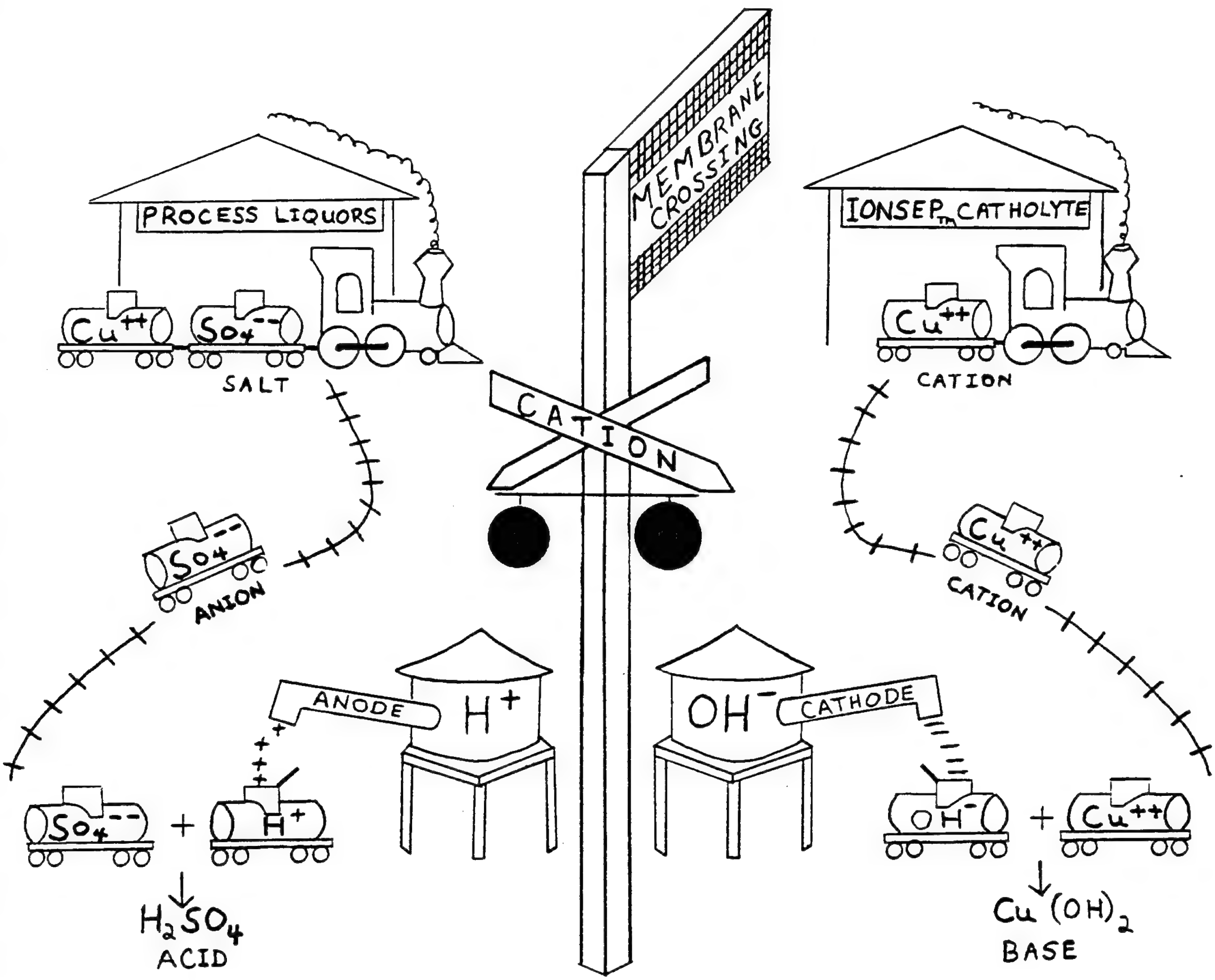
AMC
Corpus Christi AD

The following literature is in reference to:

Project #	Project Title
20	Reclamation of Cr from Plating Baths
21	AIVD Equipment/Support

#20



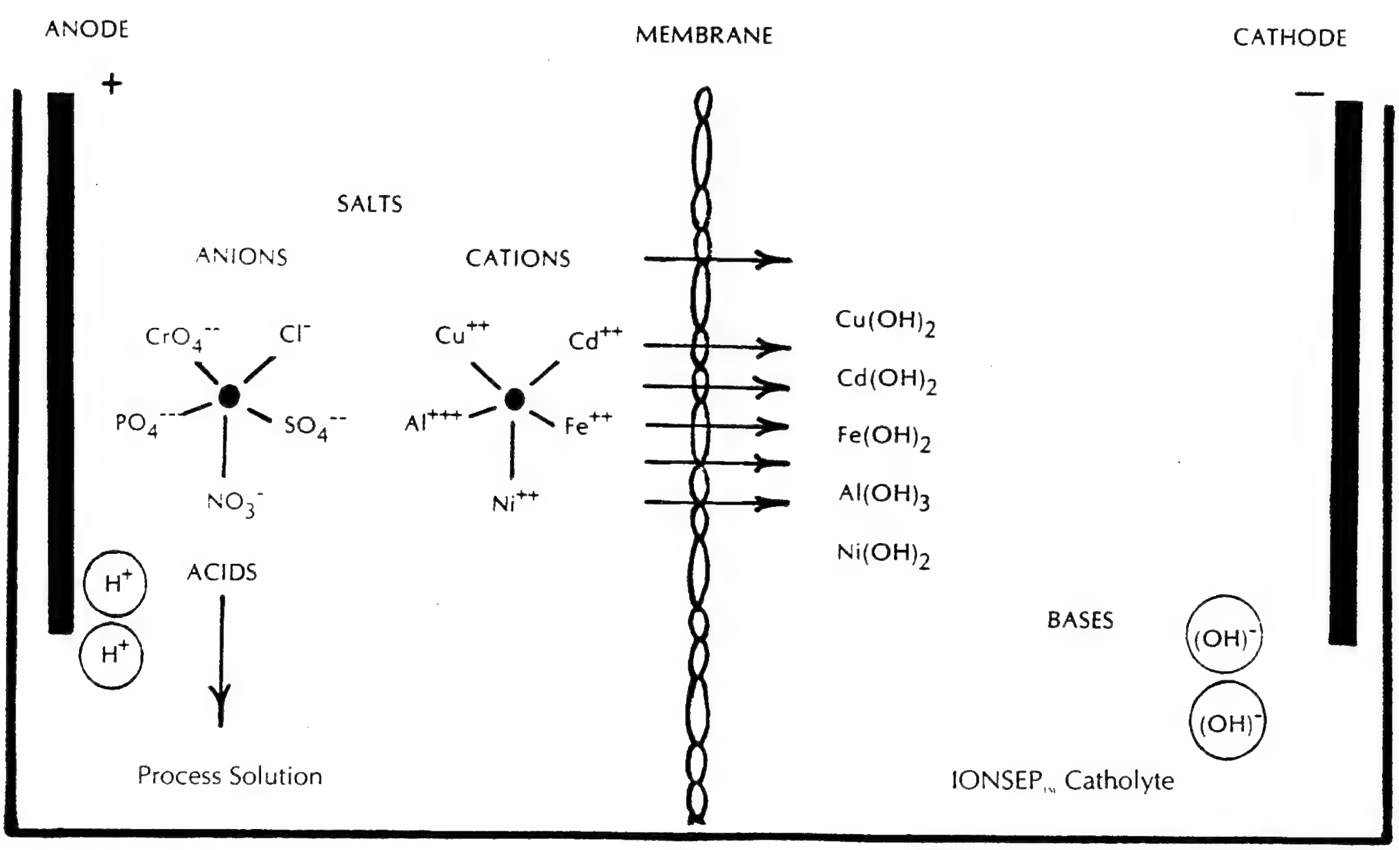


IONSEP CORPORATION INC. P.O. Box 258 Rockland, DE 19732 302-798-7402

IONSEP PROVIDING NEW TECHNOLOGY

ELECTROCHEMICAL CONVERSION OF SALTS

Acids are reacted with bases and metals everyday to make salts. Each year thousands of tons of heavy metal wastes are made in chemical processing that must be securely landfilled. Almost every step in making heavy sludge or chemical destruct of materials leads to the formation of large quantities of soluble salts. Most of these soluble salts are now discharged into the waters of the world causing costly environmental problems. Ionsep has invented, developed and made commercial a simple process for converting any salt in an aqueous solution into the separate acid and base of the salt using electricity in a membrane electrodialytic process. This capability of converting a salt to an acid and a base makes IONSEP Electrodialytic Processes somewhat a perpetual motion machine using electricity that is broadly useful in chemical processing. Ionsep provides you with the know-how and equipment to reuse your process chemicals, reuse your rinse water and enter the era of closed loop processing. You can continuously reform your process chemicals with electricity to maintain a preferred and reproducible process solution for making quality products at lower cost. The era of chemical destruct, sludge production and landfill is ending and the era of recycling is beginning. The trend is to reuse and not make waste.

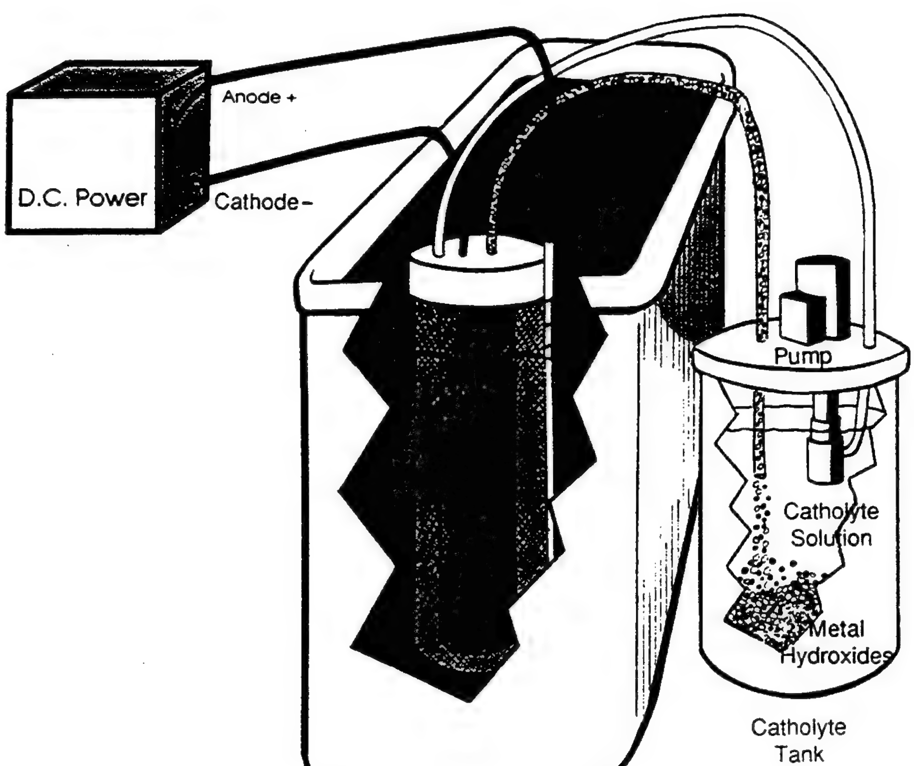


IONSEP™

ELECTRODIALYTIC PROCESSES

A SIMPLE PROCESS

The IONSEP Process comprises a membrane electrochemical cell, a rectifier, a process solution containing metal salts, an IONSEP Catholyte Solution and a pump to flow the catholyte solution through the cell. The membrane separates the process solution from the catholyte solution and acts as an "Electrochemical Traffic Controller" that lets metal cations go from the process solution through the membrane (electrofilters the metals) into the catholyte solution and keeps anions in the process solution. The metal cations are continuously converted to hydroxides in the catholyte solution and the anions are continuously converted to acids in the process solution. The hydroxides of multivalent metals (cadmium, zinc, iron, copper, aluminum, calcium, etc.) are substantially insoluble in the catholyte and can be removed for use. The IONSEP Process is unique in that salts of multivalent metal cations can be converted. There is essentially no electrodeposition of metals. The IONSEP Process can be operated at reproducible capacities for months and requires about one hour per week of operator assistance. Only electricity and water are used to convert process salts to acids and bases.

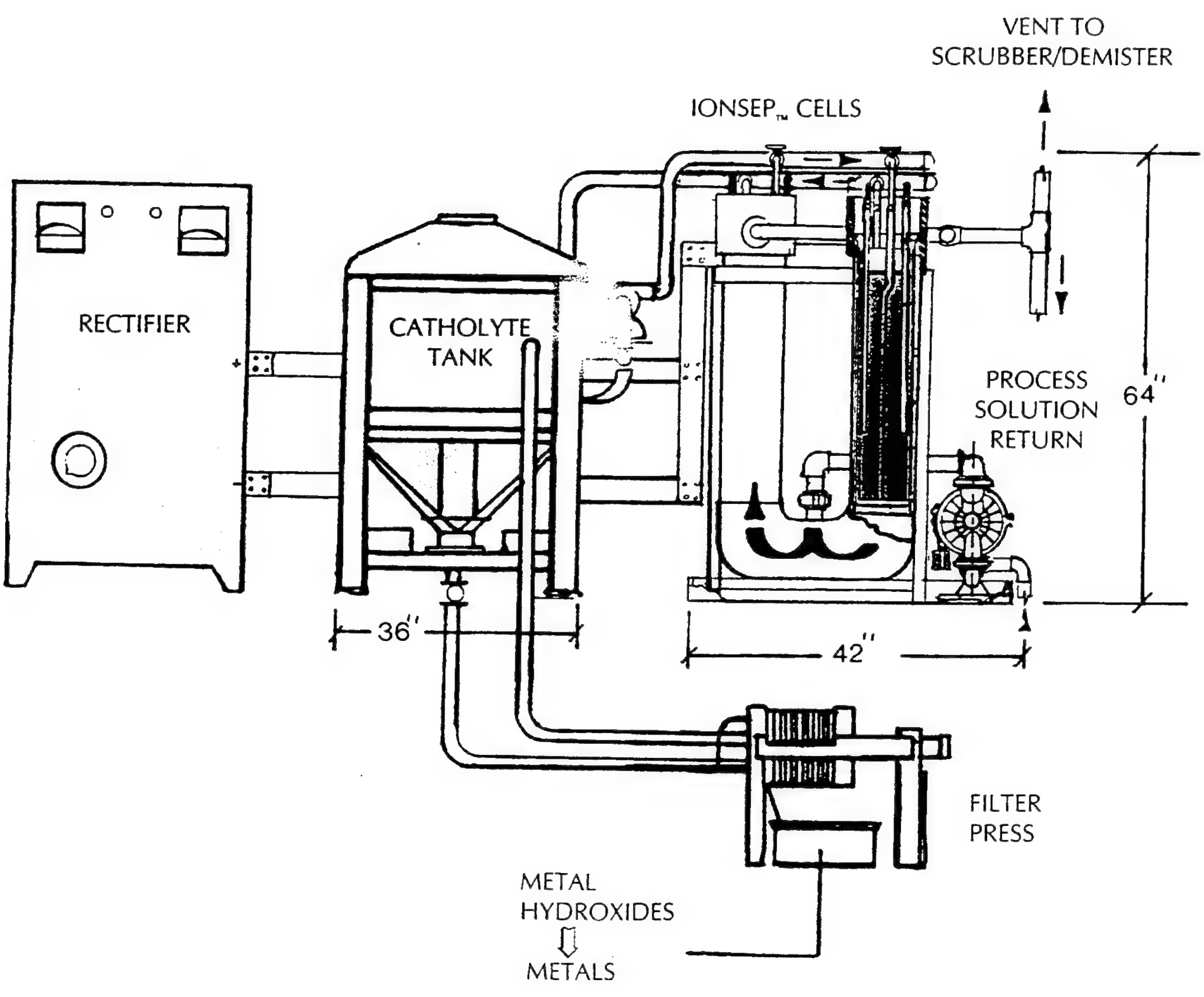


*IONSEP™ ELECTROCHEMICAL CELL manufactured under U.S. Patent Nos. 4,654,137 & 4,750,525

ELECTROCHEMICAL

Ionsep Electrochemical Systems are available in essentially all capacities for continuously purifying and reforming process solutions. Modular, Portable, and In-Process-Tank Systems are designed to carry out IONSEP Electrodialytic Processes.

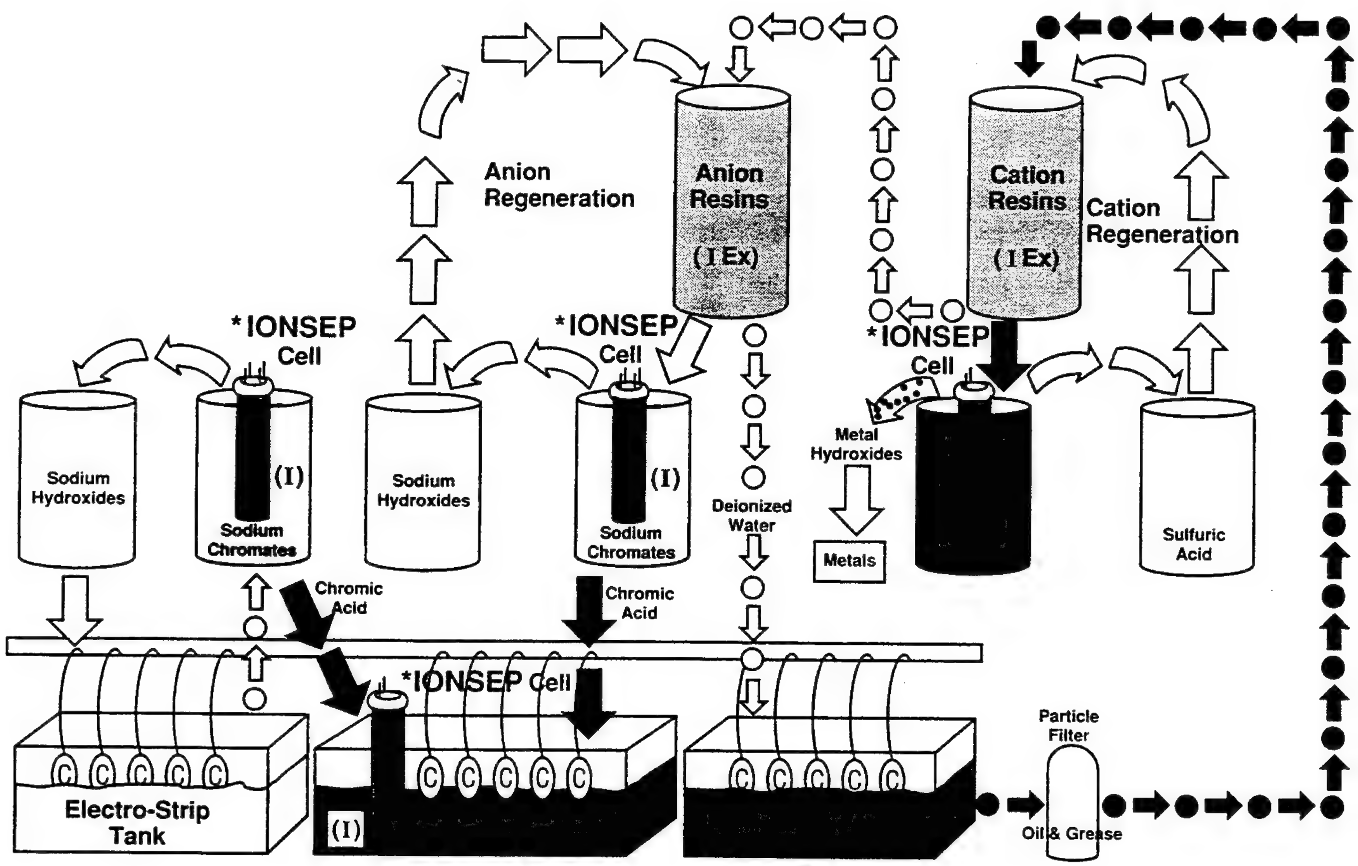
IONSEP 6000 ELECTROCHEMICAL SYSTEM



SYSTEMS

CLOSED LOOP

Ionsep has developed an Ion Exchange System tailored and instrumented to work in concert with the IONSEP Electrodialytic Processes. Ionsep Closed Loop Systems are sized and engineered with technologies that are most cost effective and provide for essentially complete use of chemicals and water. The cornerstones of the Closed Loop Systems are IONSEP Electrodialytic Processes which are used to purify and reform solutions of chemicals used in surface finishing and other processes. Evaporation is often used to concentrate stagnant rinse for return to the finishing solution and ion exchange is used to remove chemicals from a flowing rinse. The rinse is reused. The chemicals removed from the rinse and regenerants of the ion exchange resins are reformed, purified and reused. Reverse osmosis, electrowinning and other technologies are used when justified economically. The waste is essentially the metals dissolved in the finishing steps. The way to minimize waste is not to make it.



(*) IONSEP™ Electrochemical Cell (I) IONSEP™ Electrodialytic Processes (I Ex) IONSEP™ Ion Exchange Process

IONSEP™
ELECTRODIALYTIC PROCESSES

BROADLY USEFUL TECHNOLOGY

Ionsep Electrochemical Systems can be used to:

* Convert Trivalent Chromium to Chromic Acid
* Remove Metal Impurities
* Permit Recycle of Rinse or Rinse Concentrate
* Provide Reliable Processing - Fewer Rejects
* Control of Salt to Acid Ratio
* Separation of Metal Cations
* pH Control

Systems are available for chromic acid solutions used for:

* Electroplating
* Anodizing
* Etching Plastics
* Etching Metals
* Dichromate
* Tri Acids for Deox of Aluminum
* Oxidation of Organics
* Chromating and Conversion Coatings

Systems are available for:

* Reforming caustic electrostrip - sodium chromate solutions to pure caustic and chromic acid solutions.

* Other acids - Etching, Anodizing, Pickling, etc. Acids reformed continuously and metals removed

Ionsep Corporation

Electrochemical Technology

invents engineers
researches develops
manufactures

* IONSEP Electrodialytic Processes
* Electrochemical Systems
* Closed Loop Systems

MAKING TOMORROW BETTER
with
IONSEP
ELECTRO CHEMISTRY

A License is required to operate IONSEP Electrodialytic Processes

U.S. Patents Nos.
4,325,792 and 4,439,293 and 4,636,288
4,652,351 and 4,684,453 and patents pending

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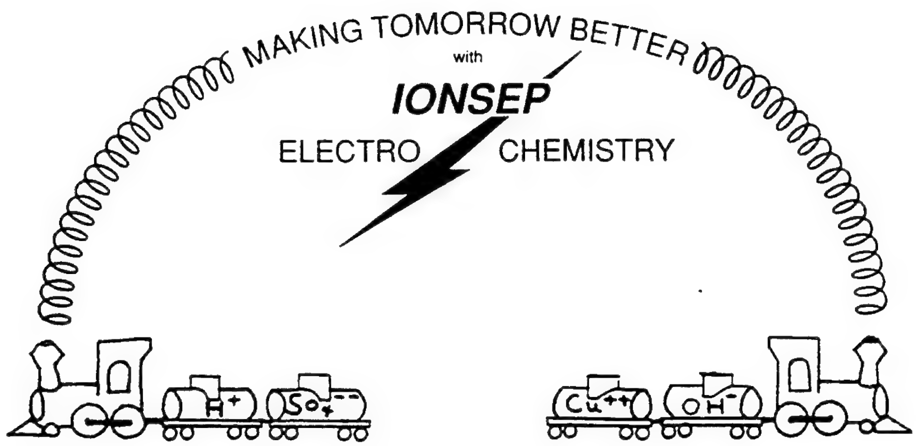
ELECTRODIALYTIC PROCESSES



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Publication Date
July,1990

Printer
Joseph W. Small Associates, Inc.

#21

SUBMITTING ORGANIZATION: Corpus Christi Army Depot (CCAD)

DATE OF SUBMISSION: 21 March 1990

PROJECT TITLE: Ion Vapor Deposition of Aluminum (Ivadizer)

PROJECT FUNDING: FY 91 DERA Funding

MISSION STATEMENT:

A major portion of this mission involves the stripping and re-application of electrically deposited metal coatings otherwise known as electroplating.

OBJECTIVE OF ANALYSIS:

The objective of this analysis is to determine the best method of applying a corrosion resistant coating to high-strength carbon steel parts.

BACKGROUND:

Electroplating is an electrochemical process where dissolved metals are deposited on the surface of other metals to provide corrosion resistance or to replace parent metal that was either worn or machined away. This process has enabled CCAD to reclaim many engine and component parts that would otherwise be discarded.

Cadmium plating is a process where cadmium metal is deposited over the surface of carbon steel to provide corrosion resistance. The process entails dissolving cadmium oxide, the "metal salt", in a solution of sodium hydroxide and sodium cyanide. Please note that sodium cyanide is a deadly poison and under the right conditions will form hydrogen cyanide gas.

The part to be plated is placed into the solution and a DC current is applied to the solution and the part. The part is negatively charged and the solution is positively charged. The dissolved cadmium metal flows through the solution and deposits on the part's surface. As the metal crystallizes, hydrogen gas is formed at the part's surface.

The hydrogen gas can be trapped in the coating and in the pores of the base metal (part). Later, when the part is put under stress, the trapped hydrogen can cause premature cracking of the part. This is known as hydrogen embrittlement.

To prevent this problem, the part must be baked in an industrial oven to allow the gas to escape through pores in the cadmium metal coating.

The main workload for cadmium plating is providing corrosion protection for steel parts. Many of the aircraft steel parts are made of high-strength steel alloys and this is where hydrogen embrittlement can cause the most damage. Steels are rated according to their tensile strength: the higher the tensile strength the harder the steel. Tensile strengths are measured in 1,000 lbs force per square inch or KSI.

The higher the ksi steel strength, the longer the part must be baked and the higher the baking temperature. Ultimately, there is a ksi strength at which baking can not relieve hydrogen embrittlement - parts with a ksi strength greater than 200 ksi can not be cadmium plated. Currently these parts must be replaced 100% when the aircraft is overhauled.

This analysis investigates the use of a new process, Ion Vapor Deposition of Aluminum, as a substitution for cadmium plating. The new aluminum coating provides better corrosion resistance than cadmium without inducing hydrogen embrittlement into the high strength steel parts. This process will allow parts with a tensile strength greater than 200 ksi to be reclaimed.

A detailed cost analysis follows.

CONSTRAINTS:

1. Per regulatory guidelines (AR 11-28), cash flows have been developed using constant dollars, discounted at the rate of 10%.

2. The policy of maintaining mobilization capacity per DODI 4515.15 and AR 750-2 will continue.

3. The DOD directive instructing all depots, by the year 1992, to decrease the amount of hazardous waste generated by 50 percent.

ASSUMPTIONS:

1. Regarding any potential equipment purchase, it is assumed that funding for capital investment will be available as required.

2. The equipment class for the Ivadizer equipment is 4940-, and a twenty year economic life will apply for all alternatives investigated in this analysis.

3. The Plating Shop's workload will remain constant over the life of the project.

4. Straight line depreciation will be utilized in this analysis.

5. CCAD's primary mission of aircraft maintenance will continue over the life of the project.

6. Cost estimates on the proposed system were made from engineering estimates based on equipment manufacturer's data.

7. The plating shop will continue to operate two shifts per day.

8. This analysis is based on a 250 day work year.

9. Electrical equipment is 80% efficient.

10. Hazardous waste disposal costs will not increase over the life of the project.

11. Eighty percent of the cadmium plating workload can be converted to the Ion Vapor Deposition of Aluminum Process (Ivadizer).

ALTERNATIVES:

Alternative One - Status Quo. Continue Cadmium Plating.

Alternative Two - Procure Equipment to Perform the Aluminum Deposition Process (Ivadizer).

Alternative Three - Perform acid cadmium plating in lieu of cyanide cadmium plating. This process still generates a cadmium sludge and can not be used on high strength steel parts. Therefore, this alternative is not considered.

COST SUMMARY

The total (discounted) project cost and uniform annual cost of the two alternatives are shown below. A detailed cost analysis of alternatives One and Two is performed in the following sections.

Alternative	Total Project Cost	Uniform Annual Cost
1	$11,325,618	$1,124,131
2	$3,293,811	$326,929

BENEFIT SUMMARY

The following table presents a summary ranking of the alternatives related to various benefits and outputs of each. More complete discussion can be found in the benefits analysis section of this analysis.

Benefits	Alternatives 1	Alternatives 2
Reduction of Landfill Liability	Poor	Excellent
Corrosion Protection	Good	Excellent
Conservation of Water	Poor	Excellent
Employee Safety	Dangerous	Safe

SENSITIVITY ANALYSIS SUMMARY

A sensitivity analysis is used to evaluate what happens if your constraints change. There are two constraints in the Economic Analysis that should be addressed. They are as follows:

1. Assumption 11 - Eighty percent of the cadmium plating workload can be converted to the Ion Vapor Deposition of Aluminum Process (Ivadizer) [12]. This assumption was made after research into the quantity, size and configuration of the parts was performed. It is an engineering estimate. Therefore, a sensitivity analysis was performed to evaluate the effect on the Economic Analysis if only 50% of the parts can be switched to the new process.

2. The analysis is based on a 100% reclamation of parts having a tensile strength greater than 200 KSI. This may not always be true. These parts may require replacement due to wear, or damage. Therefore, a sensitivity analysis shall be performed to evaluate the effect of a 50% reduction in reclaimed parts.

3. The worst case would be the summation of the above analyses. Therefore, a sensitivity analysis was performed with only 50% of the parts being switched to the Ivadizer process and only 50% of the high strength steel parts being reclaimed.

SENSITIVITY ANALYSIS SUMMARY

	TOTAL PROJECT COST	
SENSITIVITY VARIABLE	**ALTERNATIVE 1**	**ALTERNATIVE 2**
1. 50% Converted	$9,691,590	$1,909,321
2. 50% Reclaimed	$8,016,814	$2,129,376
3. (1 and 2) Combined	$6,287,170	$1,769,626

The sensitivity analysis summary data and Format A & A1's are attached (Enclosure 1). The sensitivity analysis shows that Alternative 2, the Ivadizer, is the best alternative under all conditions.

POST INVESTMENT ANALYSIS

The savings generated by this new process may be documented by monitoring the number of parts processed through the Ivadizer and the number of hours of operation. The amount of chemicals used can be obtained directly from chemists' records. A log book will be set up to record the number of parts reclaimed by the ivadizer.

Maintenance and repair costs are available from Depot Equipment Division, Property Book Office and is documented by the equipment's bar code number. Utility costs are also calculated from the number of hours of operation.

RECOMMENDATION

It is recommended that approval be given to immediately initiate action to implement Alternative Two. In addition to being the least costly overall, Alternative Two is the preferred alternative based on the benefits and sensitivity analysis as well.

COST ANALYSIS

Alternative One - Status Quo: Continue Cadmium Plating.

A. **Current assets required:** There is no equipment associated with this alternative. Therefore, only recurring costs will be associated with this alternative.

B. **Recurring costs:** Recurring costs associated with this alternative are as follows: plating labor, purchase of rinse water, rinse water treatment, cadmium sludge disposal, calcium carbonate disposal, chemical consumption, laboratory testing, maintenance & repair, and for utilities.

Nine platers are required to perform cadmium plating. Six employees are on the day shift, and three employees are on the third shift [1]. The labor cost for the Plating Shop, 5CB1A, is $17.31 per hour for the day shift, and it includes $2.71 for personnel benifits and $2.32 for leave accural [2]. The shift differential for the third shift is ten percent [3]. The shop averaged 500 hours of overtime per employee last year in support of cadmium plating operation [1]. Therefore the labor costs associated with cadmium plating are as follows:

Day shift cost = ($17.31/hr)(6 employees)(2000 hrs/yr)

= $ 207,720 per year

Third Shift Cost = {($17.31/hr) + .1($17.31 - $2.32 - $2.71)} (3 employees) (2000 hrs/yr)

= $ 111,228 per year

Overtime Cost = ($17.31 - $2.32 - $2.71)(6 employees)(1.5 * 500 hrs) + ($17.31 - $2.32 - $2.71)(1.1)(3 employees)(1.5 * 500 hrs)

= $ 85,653 per year

Total Labor Cost = ($207,720 + $111,228 + $85,653) per year

= $ 404,601 per year

The cadmium plating operation generates an average of 12,000 gallons of rinse water per day [4]. This water contains cadmium at a concentration of 40 parts per million (ppm) and also contains cyanide [5]. The procedure for treatment is to first destroy the cyanide with chlorine gas and then remove the heavy metals. The cost to treat the rinse water is $0.03 per gallon, and the cost to dispose of the metal sludge is $0.37 per pound [6].

Rinse Water Flow Rate = (12,000 gal/day)(250 day/yr)

= 3,000,000 gallons per year

There are two costs associated with the rinse water. The first is the cost to purchase the water. Water costs $0.00173 per gallon [7]. The water purchase cost is as follows:

Water Purchase Cost = (3,000,000 gal/yr)($ 0.00173 /gal)

= $ 5,190 per year

The second is the cost to treat the rinse water. This cost is as follows:

Water Treatment Cost = (3,000,000 gal/yr)($ 0.03 /gal)

= $ 90,000 per year

As previously stated, the cadmium concentration in the rinse water is 40 ppm. The following conversion factors are used: (.0584 grains/gal*ppm) and (7000 grains/pound) [8]. Therefore, the amount of cadmium which must be treated is calculated as follows:

Cadmium Generated = (3,000,000 gal rinse water/yr)(40 ppm cadmium) (0.0584 grains/gal*ppm) / (7000 grains/pound)

= 1001 pounds cadmium per year

The cadmium is reduced to a sludge in the Industrial Waste Pretreatment Plant (IWPTP). During this process, cadmium hydroxide ($Cd(OH)_2$) is generated. This compound is 1.3 times as heavy as cadmium, and therefore the weight of the sludge generated is as follows:

Cadmium Sludge = (1001 lb cadmium/yr)(1.3 lb sludge/lb cadmium)

= 1301 pounds dry sludge per year

This would be the weight of dry cadmium hydroxide, but the sludge is wet. In fact, 85% of the sludge is water [6]. The disposal cost for cadmium sludge is $0.37 per pound. Therefore, the total sludge generated and the annual cost for sludge disposal is calculated as follows:

Total Sludge = (1301 lb cadmium sludge/yr) / (0.15 lb cadmium sludge /lb wet sludge)

= 8,673 pounds wet sludge per year

Cadmium Sludge Disposal Cost = (8,673 lbs sludge/yr)($0.37 /lb)

= $3,209 per year

Additionally, each of the Cadmium plating tanks must be treated for carbonate contamination. Once a year, the plating solution is transferred into a special tank and the solution is chilled to 32 degrees Fahrenheit (F). At this temperature, calcium carbonate crystallizes and settles to the bottom. The carbonate free solution is then returned to the plating tank. The carbonate crystals are drummed and sent off base for disposal at a cost of $10.00 per gallon [9]. An additional charge of $165.00 is charged for the disposal of the 55 gallon drum [9]. The amount of calcium

carbonate from all six plating tanks is 241.5 gallons. This calculation is provided in Table _1_. The drums are filled with 50 gallons of solution, allowing room for expansion. Therefore 5 drums are required to dispose of the calcium carbonate. The total disposal cost for the calcium carbonate is the sum of the drum disposal cost and the liquid disposal cost. Calculations follow:

Drum disposal cost = (5 drums/yr)($165/drum)

= $ 825 per year

Liquid Disposal Cost = (241.5 gal/yr)($10/gal)

= 2,415 per year

Total Carbonate Disposal = ($825/yr + $2,415/yr)

= $3,240 per year

Plating operations deplete the chemicals in the tanks. Therefore, chemicals must be added periodically to replenish the ones removed during the plating operations. The chemical consumption and cost data is depicted in Table_2_.

Chemical Consumption Cost = $19,825 per year

All six plating tanks must be tested monthly for chemical make-up, impurities, and hydrogen embrittlement tendencies. Sixty hours per month are required to test all the cadmium plating baths [10]. The Work Center performing the testing is F6B00, Chemical Branch. Their labor rate is $17.05 per hour [2]. The testing cost calculated as follows:

Labor Cost = (60 hrs/mo)(12 mo/yr)($17.05)

= $12,276 per year

Hydrogen embrittlement testing requires the use of three notch tensile test specimens per tank. This test must be performed monthly and each test specimen costs $50.00 each [5]. The cost of the test specimens is as follows:

Test Specimen Cost = (3 specimens/tank)(6 tanks/mo)(12 mo/yr)
($50/specimen)

= $10,800 per year

Total Laboratory Cost = ($12,276/yr + $10,800/yr)

= $ 23,076 per year

All steels which have a tensile strength of 160 KSI (KSI = 1000 pounds per square inch) or higher must be baked after cadmium plating to relieve hydrogen embrittlement. Parts having a tensile strength of 160 KSI are baked at 275 and 375 degrees F for at least four hours. Parts having a

tensile strength of 180 to 200 KSI must be baked at 375 degrees F for 23 hours [10]. Six ovens are required to meet the baking requirements and are operated 24 hours a day for six days a week [1]. A summary of the oven capacities and utility costs is provided at Table _3_.

Oven Utility Cost = $ 44,496 per year

Approximately 784 manhours were spent performing routine maintenance and repair of the tanks and equipment associated with cadmium plating [11]. The labor rate for Work Center 3QE00, PM Team 1, is $17.35 per hour [2].

Maintenance Cost = (784 hrs/yr)($17.35/hr)

= $13,602 per year

The last cost associated with this alternative is the cost of replacing the parts which have a tensile strength greater than 200 KSI and must be replaced. Six parts were identified by the Rotor Head Shop as 100% replacement because the tensile strength was greater than 200 KSI. A summary sheet is provided at Table _4_ which depicts the parts information and costs.

Parts Replacement Cost = $762,212 per year

C. Total Recurring Costs - Alternative One

TOTAL PLATING COSTS:

PLATING LABOR	$404,601 /YR
RINSE WATER PURCHASE COST	$5,190 /YR
RINSE WATER TREATMENT	$90,000 /YR
CADMIUM SLUDGE DISPOSAL	$3,209 /YR
CALCIUM CARBONATE DISPOSAL	$3,240 /YR
CHEMICAL CONSUMPTION	$19,824 /YR
LABORATORY TESTING	$23,076 /YR
OVEN UTILITY COST	$44,496 /YR
MAINTENANCE & REPAIR COST	$13,602 /YR
	============
TOTAL	$607,238 /YR

Twenty percent of the cadmium workload can not be processed in the Ivadizer [Assumption 11][12]. The Ivadizer can not coat internal bores deeper than one and one half (1 1/2) times the opening diameter. Therefore only 80 % of the operating cost will be eliminated with the purchase of the new equipment. The Plating operating cost is adjusted as follows:

Plating Operating Cost (Adj) = ($607,238/yr)(.80)

= $ 485,790 per year

PLATING OPERATING COSTS (ADJ)	$485,790 /YR
REPLACEMENT PART COST	$762,212 /YR
	============
TOTAL:	$1,248,002 /YR

Alternative Two - Procure Equipment to Perform the Aluminum Deposition Process (Ivadizer).

This alternative requires a new investment in an Ivadizer and supporting racks which will apply a uniform aluminum coating on steel parts. This coating is a direct replacement for cadmium plating and generates zero hazardous waste. This process is applicable to 80 % of the current cadmium plating workload [12]. The process can not coat internal diameters that are deeper than one and 1/2 times their diameter [13]. Therefore some parts will still require cadmium plating.

A. **New Investment**

The Ivadizer will consist of a 6 foot by 10 foot vacuum chamber, vacuum pumping system, closed loop water cooling system, and control instruments. Additionally a standard rack, rotary rack, and barrel accessory shall be provided. The total installed cost of the Ivadizer system is $900,000 dollars [13].

B. **Recurring costs:** The recurring costs associated with this alternative are labor costs for operation and preventive maintenance, utility costs, material costs and maintenance & repair costs. The closed loop water cooling system filling cost is negligible (water cost is less than one dollar). Four personnel from Work Center 5CB1A are required to operate the Ivadizer: Two personnel to prepare and finish parts and two personnel to operate the equipment [1].

A total of 43,645 parts require cadmium plating [Table _5_], and 80% of these parts can be coated in the Ivadizer [12]. This process will also reclaim an additional 9,984 parts which must be replaced under the current cadmium plating process [Table _4_] [12]. Therefore, a total of 44,900 parts can be coated with aluminum in the Ivadizer. The Ivadizer holds a 6 foot by 10 foot rack of parts. Based on the average part size, sixty parts can be supported on the rack and coated during each cycle. Four cycles can be performed in a 10 hour work day [12] [13]. The number of cycles required to coat all the parts is calculated as follows:

Number of Cycles = (44,900 parts/yr)(60 parts/cycle)

= 748 cycles per year

The number of days required to process the parts is as follows:

Number of Days = (748 cycles/yr)/(4 cycles/day)

= 187 days for production operations

Personnel from Work Center 5CB1A will operate the equipment. The hourly rate for this Work Center is $17.31 per hour [2]. The standard work week is four, ten hour days. The labor cost for the operation of the Ivadizer is as follows:

Labor Cost = (4 employees)(187 Days)(10 Hrs/day)($17.31/hr)

= $ 129,479 per year

Preventive maintenance and operator maintenance must be performed monthly and can be performed at the same time. These costs are calculated as follows:

Operator Maintenance Cost = (4 employees)(12 Days/yr)(10 hrs/day)($17.31/hr)

= $ 8,309 per year

Preventive maintenance shall be performed by PM Section 1, Work Center 3QE00, and the labor rate is $17.44 per hour [2]. The supervisor estimates that 240 manhours per year will be required for preventive maintenance [11]. The crucibles required to vaporize the aluminum wire are expendable and require monthly replacement (or every 80 cycles) [13]. Since a monthly PM will be performed, the crucibles will be replaced each month. The Ivadizer has 7 crucibles and the replacement cost is $25.00 each [13]. Therefore, the maintenance and repair cost is calculated as follows:

Maintenance Labor = (240 hrs/yr)($17.44/hr)

= $ 4,186 per year

Crucible Cost = (12 PMs/yr)(7 crucibles/PM)($25.00 each)

= $ 2,100 per year

Total Maintenance Cost = ($4,186/yr + $2,100/yr)

= $ 6,286 per year

Operating Costs include utilities, aluminum wire, and argon gas costs. Electricity costs $0.05 per KW*hr [7]. The equipment requires 480 volts at 200 amps for one hour during each cycle, and the Ivadizer is 80% efficient on power usage [13]. Therefore, the utility cost is calculated as follows:

Utility Cost = (480 Volts)(200 Amperes)(1 Watt/volt*ampere)(1/0.80)(1KW/1000 Watt)($0.05/KW*hr)(748 cycles/yr)(1 hr/cycle)

= $ 4,488 per year

The Ivadizer consumes aluminum wire at a rate of 1.2 pounds per cycle, and the wire costs $6.00 per pound [13]. The wire cost is calculated as follows:

Wire Cost = (1.2 lbs/cycle)(748 cycles/yr)($6.00/lb)

= $ 5,386 per year

Argon gas is used to purge the vacuum chamber of impurities and also acts as an electron transfer media during discharge cleaning and aluminum coating. One and a half cubic feet of argon gas is required for each cycle [13]. Argon is purchased in bulk at the Depot and costs $1.65 per gallon (liquid) [14]. The equivalent volume in standard cubic feet (SCF) is 112.4 SCF per gallon for the depot storage tank [14]. The argon gas cost is calculated as follows:

Argon Cost = (1.5 cubic ft/cycle)(748 cycles/yr)($1.65/gal)
(1 gal/112.4 cubic ft)

= $ 16 per year

c. Total Recurring Costs - Alternative 2

OPERATOR LABOR	$129,479.00 /YR
OPERATOR MAINTENANCE	$8,309.00 /YR
MAINTENANCE & REPAIR COST	$6,286.00 /YR
UTILITY COST	$4,488.00 /YR
ALUMINUM WIRE	$5,386.00 /YR
ARGON GAS	$16.00 /YR
	===========
TOTAL	$153,964.00 /YR

D. **Terminal Value**

The terminal value of the Ivadizer is 4.48% of the investment cost after a 20 year life [15].

Value after 20 years = 0.0448 x $900,000 = $40,320

Discounting this terminal value to the present time period,

$40,320 x .142 = $5,725

Using straight line depreciation,

$900,000 - $40,320 = $859,680

$859,680 / 20 = $42,984 depreciation/yr

BENEFITS ANALYSIS

The benefits analysis consists of evaluating alternatives One and Two in the following categories: reduction of landfill liability, corrosion protection, conservation of water, and employee safety.

1. **Reduction of Landfill Liability** - The degree to which each alternative is able to decrease liability of chemical disposal in public landfills.

   a. Alternative One. The current process generates 8,673 pounds of cadmium sludge each year which is disposed of in a landfill. The Environmental Protection Agency's policy on land disposal is as follows: The waste generator is responsible for the material from "Cradle to Grave." This means that even though the Depot has paid for the disposal of the waste, if a problem in the landfill results in contamination of the environment, the Depot is liable for the cleanup.

   b. Alternative Two. This process generates zero waste for disposal in a landfill. Therefore, the Depot would have no liability in case of contamination.

2. **Corrosion Protection** - The degree to which each alternative is able to provide corrosion protection for the part.

   a. Alternative One. Cadmium plating is the specified coating for protection of steels in corrosive atmospheres. Cadmium meets the American Society of Testing Materials (ASTM) Standard B117, salt spray test for corrosion. However, it does sacrifice itself and corrode.

   b. Alternative Two. Ion vapor deposition of aluminum provides a far superior coating than cadmium when tested under the same conditions. Aluminum develops a protective oxide film on its surface which effectively retards corrosion, making it superior to cadmium.

3. **Conservation of Water** - The degree to which each alternative is able to conserve water.

   a. Alternative One. This alternative consumes water at a rate of six gallons per minute or 3,000,000 gallons per year. This water goes down the drain and must be treated and replaced.

   b. Alternative Two. The Ivadizer uses water to cool the coating chamber. This water is contained in a closed loop chilling system. Therefore, there is no water consumed with this process.

4. **Employee Safety** - The degree which each alternative provides a safe working environment for the employee.

a. Alternative One. Cadmium plating is performed in a tank containing caustic and sodium cyanide, a poison. The cyanide can be absorbed through the skin or inhaled in the form of hydrogen cyanide gas.

b. Alternative Two. Ion vapor deposition of aluminum is performed inside a vacuum chamber. Aluminum metal is vaporized and ionized to have a positive charge. Argon gas is used to transfer the aluminum ions to the part. Both argon and aluminum are non hazardous to the employee and the environment.

REFERENCES

1. Eloy Reyna, CCAD, Director of Maintenance, Engine Shops Division, Plating Shop Supervisor, AV (DSN) 861-2294.

2. Memorandum, SDSCC-RAB (37-55a), dated 16 October 1989, Subject: FY90 Predetermined Labor and Overhead Rates (Enclosure _2_).

3. Army Regulation: C1, AR 37-105, Section 4-18, Determination of Night Shift Differential Payments (Enclosure 3).

4. Victor Mendez, Naval Air Station, Corpus Christi, Industrial Waste Pretreatment Plant Supervisor, AV (DSN) 861-3294.

5. Gary Tindall, CCAD, Director for Quality, Chemical Analysis Division, Chemical Branch, AV (DSN) 861-3555.

6. Irene Blackledge, Naval Air Station, Corpus Christi, Navy Public Works, Environmental Branch, AV (DSN) 861-3776.

7. DF, SDSCC-EFF (200-1a), dated 21 October 1988, Subject: Economic Analysis of Hazardous Waste Minimization Initiatives (Enclosure _4_).

8. Chemical Engineers' Handbook, Fifth Ed., Perry & Chilton, McGraw-Hill, 1973, pp 1-24,25.

9. Verlin Teage, DRMO Environmental Protection Specialist, AV (DSN) 861-2936, Contract Number DLA 200-88-R-0035.

10. Jeff McFarland, CCAD, Director for Quality, Chemical Analysis Division, Chemical Branch, AV (DSN) 861-2301.

11. Jim Folk, CCAD, Director of Engineering & Logistics, Depot Equipment Division, Installation Equipment Management Branch, Preventive Maintenance Section 1 Supervisor, AV (DSN) 861-2038.

12. Roy Freeman, CCAD, Director of Maintenance, Production Engineering Division, Engineering Branch, Electrical Engineer, AV (DSN) 861-3243.

13. Data was obtained from Abar Ipsen Industries literature and sales representative, Graham T. Legge, 905 Pennsylvania BLVD, Feasterville, PA 19047, (215) 355-4900.

14. Cameron Webb, CCAD, Director for Maintenance, Production Control Division, Metal Spray Shop Production Controller, AV (DSN) 861-2294.

15. CA Letter 82-5, Useful Life and Residual Value, dated 25 August 1982, page 10, 4610 class (Enclosure _5_).

16. Frank Sanchez, CCAD, Director of Maintenance, Production Control Divsion, Program Control Branch, AV (DSN) 861-2437.

LIST OF TABLES

LIST OF ENCLOSURES

1. Sensitivity Analysis.

2. Memorandum, SDSCC-RAB (37-55a), dated 16 October 1989, Subject: FY90 Predetermined Labor and Overhead Rates.

3. Army Regulation: C1, AR 37-105, Section 4-18, Determination of Night Differential Payments.

4. DF, SDSCC-EFF (200-1a), dated 21 October 1988, Subject: Economic Analysis of Hazardous Waste Minimization Initiatives.

5. CA Letter 82-5, Useful Life and Residual Value, dated 25 August 1982, page 10, 4610 class (Enclosure _5_).

6. Manufacturer's Literature, obtained from Abar Ipsen Industries literature and sales representative, Graham T. Legge, 905 Pennsylvania BLVD, Feasterville, PA 19047, (215) 355-4900.

7. HAZMIN Report.

8. SDS Form 900 R.

AMC
Red River AD

The following literature is in reference to:

Project #	Project Title
23	Solvent Distillation Systems
	Hazardous Waste Minimization Incentive Awards Program

#23
RRAD

PRI

M O D E L

SCR

(SCRAPED SERIES)

DISTILLATION UNIT

PRI

Effective Date:
February 15, 1988
Revised: 3/1/90

GENERAL SERVICES ADMINISTRATION
#GS-OOF-05802
Modification No. 1

DISCOUNTED PRICE SHEET

MODEL SCR - OIL HEATED

* For unit quantities of three or more, please contact factory for additional discount.

Model	Boiler Size	Rate	KW	GSA Disc. Price
SCR-150	45 Gallons	10-15	9	$33,670
SCR-250	100 Gallons	30-45	36	42,227
SCR-350	200 Gallons	50-65	45	49,627
SCR-450	300 Gallons	75-85	75	60,865

MODEL SCR - STEAM HEATED - ASME Steam Jacket

Model	Boiler Size	Rate-GPH	Steam-PPH	GSA Disc. Price
SCR-150SP	45 Gallons	20-24	80	$36,168
SCR-250SP	1[illegible] Gallons	40-50	145	41,995
SCR-350SP	200 Gallons	65-75	215	50,043
SCR-450SP	300 Gallons	85-95	290	63,548

OPTIONS

NOTE: Options #AF, #BF, #AP, #AC, #V-10, #V-60, and #V-175 MUST use the "Options" (#OCP) Control Panel or the "Thermal Display" (#TDP) Control Panel. Make the necessary control adder when supplying one or more of these options.

#AF Deluxe Auto Fill includes: Electronic Level Probe; Electric Subpanel #1; Pneumatic Feed Valve; Pneumatic Feed Pump; SS Hose 2,692.00

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Page Two

Options (continued)

#BF	Base Feed & Level Control: Same as #AF Option except it does not include Pneumatic Pump nor Flexible Hose	2,045.00
#CT	Cycle Complete Timer - Shuts system off after preset time (field setable)	232.00
#UL	UL Label attached to the Control Panel (NOTE: Only available with "Thermal Display" Control Panel)	199.00
#AP	Annunciator Panel Package includes: Red Alarm Lights, Audible Alarm and Reset Button in Main Panel. Alarm functions are: low oil level (except SC-25W), low coolant flow, high oil temperature, and high condenser outlet temperature	2,220.00
#SS	Vapor Temperature Safety Shut Off includes Temperature Sensor, Temperature Meter, and Control Logic	727.00
#AW	Auto Water Controller includes: Automatic Pneumatic Water Control Valve and necessary controls (Automatically turns water on-off during operation)	870.00
#EB	Elevated Base (SC-50 - 200) Ring base for discharge to drum	629.00
#EP	Elevated Platform: Provides Ladder, Handrails and Standing Space on both sides of unit (Discharge to drum)	1,712.00
#AC	Auto Cooldown Package includes: Pump; Heat Exchanger; Piping; Solenoid; and necessary control logic (For SC-50, SC-100 & SC-200)	3,312.00
#GL	Glycol Loop Cooling System including: Remote Air Cooled Unit with Free Standing Air Coil; Fan with TEFC Motor; Expansion Tank; Circulating Pump; and all necessary starters and control logic (For SC-25, SC-50 & SC-100)	2,590.00

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Page Three

Options (continued)

#DF-55	Drum Fill Package consists of: Flexible Hose from Condenser to Drum; Quick Coupler; 2" Bung Hole Adapter with Drop Pipe, Anti-Syphon Vent, Built-in Handle; and a UL Approved Flame Arrester	592.00

Control Panel Options (SC-25, SC-50 & SC-100 Only)

#DTR	Digital Temperature Readouts on ETC's for Oil Jacket and Vapor Temperature	333.00
* #OCP	"Options" Control Panel with digital temperature readouts (can be used when #AF, #AP, #AC, #V-10, #V-60, or #V-175 are required in lieu of "Thermal" Display" Panel)	740.00
#TDP	"Thermal Display" Panel complete with power disconnect switch. (Can be used with any options package. Only panel that can carry UL Label.) . . .	1,342.00

Vacuum Options

#V-10B	Base Vacuum Package includes: Vacuum Pump; 5 Gallon Stainless Steel Cooling Tank; Cooling Loop Heat Exchanger; Base; Vacuum Gage; and Electric Controls . . . . (NOTE: Seal Cooling Loop Package may be deducted at $700.00.)	5,176.00
#V-60	Deluxe Vacuum System includes: Vacuum Pump; 60 Gallon Stainless Steel Receiver; Transfer Pump; Vacuum Gage; and Electric Controls (Seal Cooling Loop not included)	5,097.00
#V-175	Deluxe Vacuum System includes: Vacuum Pump; 175 Gallon Stainless Steel Receiver; Transfer Pump; Vacuum Gage; and Electric Controls (Seal Cooling Loop not included)	5,578.00
Suffix CL	Seal Cooling Loop Package (For V-60 & V-175)	990.00

PRI

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Page Four

Vacuum Options (continued)

Suffix S	Adder for Stainless Steel Vacuum Pump (To be utilized on corrosive solvents; For V-10, V-60 & V-175)	1,945.00

Tank Options

#DST-175	Contaminated Solvent Day Tank; 175 Gallon; Carbon Steel Construction with Level Controls; and Logic Controls	2,760.00
#DST-300	Contaminated Solvent Day Tank; 300 Gallon; Carbon Steel Construction with Level Controls; and Logic Controls	3,044.00
#CST-60	Clean Solvent Tank; 60 Gallon; Stainless Steel Construction; Level Controls; Diaphragm Transfer Pump; Sight Glass; and Control Logic	2,724.00
#CST-175	Clean Solvent Tank; 175 Gallon; Stainless Steel Construction; Level Controls; Diaphragm Transfer Pump; Sight Glass; and Control Logic	5,032.00
#CST-300	Clean Solvent Tank; 300 Gallon; Stainless Steel Construction; Level Controls; Diaphragm Transfer Pump; Sight Glass; and Control Logic	7,715.00

Tank Port Options

Clean-Out Ports, Bolted with Blind Flange

Five Inch (5") Port	324.00
Eight Inch (8") Port	426.00
Twelve Inch (12") Port	537.00
Ten Inch (10") Quick Top Opening Port with Center Wing Nut and Teflon O-Ring	417.00

PRI

General Services Administration
#GS-OOF-05802
Discounted Price Sheet - Model SCR
Page Five

Special Notes

1. Standard electrically heated units are filled with natural heat transfer oil and should be used to a maximum of 400 deg. F.

2. Synthetic Oil should be used between 400 deg. F. and 500 deg. F

3. The services of our Separations Lab are available for $500 whic includes: Testing a single sample for distillation characteristics, gas chromatograph readout, and application recommendations. Special Service fees available upon request.

PRI

Product Bulletin: Model SCR Series Units

The Unit combines features of both the SC and LSR Series Units.

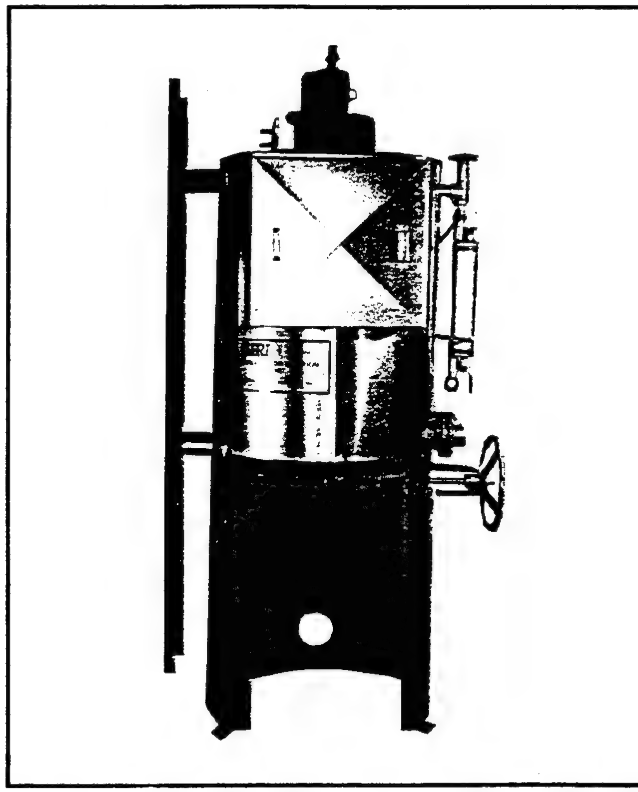
The Unit combines features of both the SC and LSR Series Units.

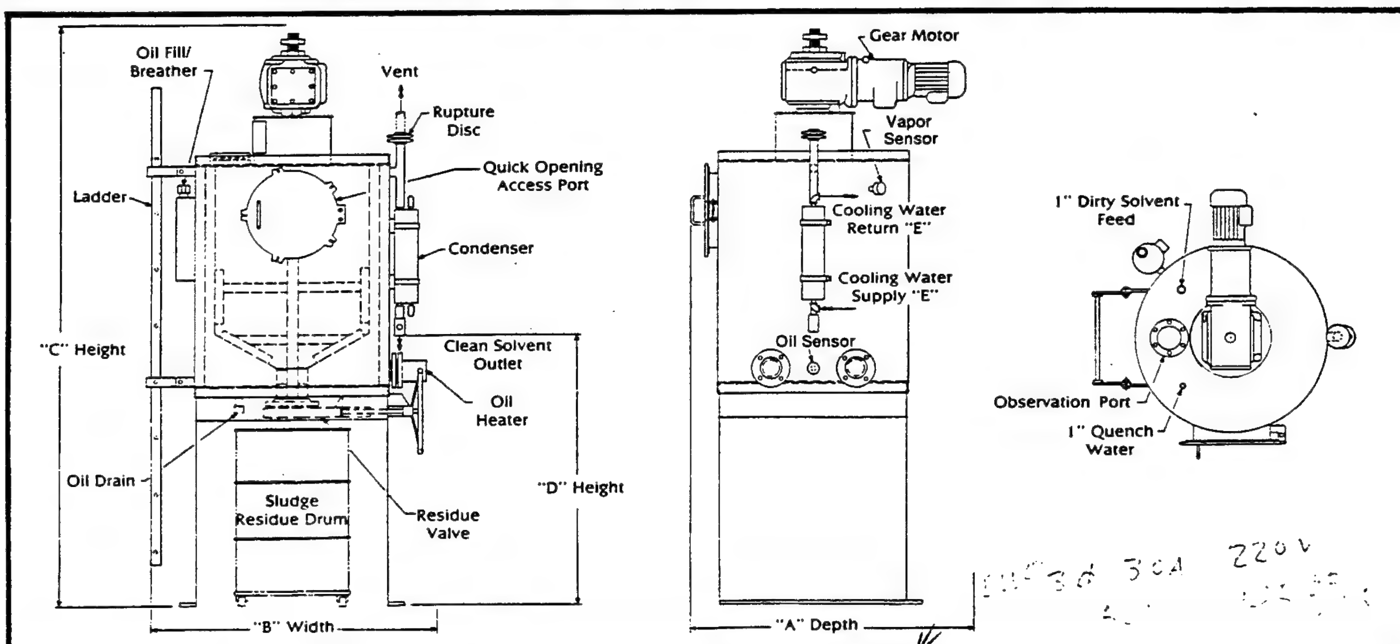
The SCR series distillation units incorporate the patented rotating scraper blade assembly similar to that used in the LSR scraped series units coupled with the control design of the SC series units. These units can be either hot oil jacketed, electrically heated, or steam jacketed. These latter units utilize an ASME coded steam jacket.

The continual scraping of the heat transfer surface assures optimum heat transfer efficiency and a constant output rate. The external blade adjustment optimizes the distillation uptime. This eliminates the need to enter the vessel for blade adjustment. This patented rotating scraper assembly keeps the heat transfer surface clean, dislodging solids from the sidewalls, and allowing their accumulation in the bottom of the vessel.

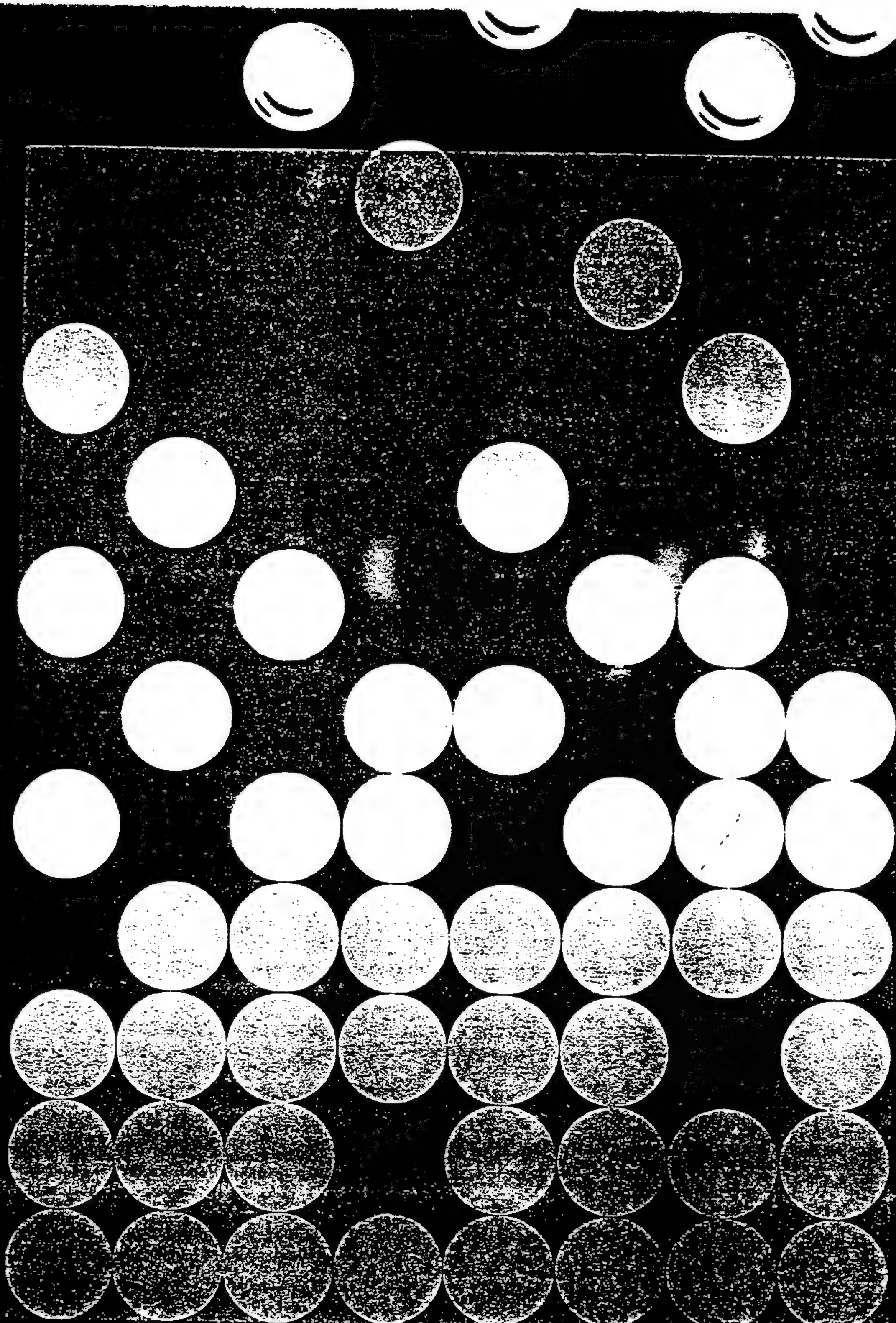
High particle laden solvent with solids content up to 50 percent can be distilled without fouling the heat transfer surface, or significantly reducing the output capacity. SCR units are elevated to allow direct discharge of residue into 55 gallon drums for disposal.

DIM.	Model No.			
(approx.)	SCR-150	SCR-250	SCR-350	SCR-450
"A"	5'-0"	5'-0"	6'-0"	7'-0"
"B"	5'-0"	5'-0"	6'-0"	7'-0"
"C"	9'-0"	10'-0"	11'-0"	12'-0"
"D"	4-6"	4'-0"	5'-7"	6'-5"
"E"	3/4"	3/4"	1"	1"
VENT	1 1/2"	1 1/2"	3"	3"





Technical Descriptions	Model SCR-150	SCR-150 SP	SCR-250	SCR-250 SP	SCR-350	SCR-350 SP	SCR-450	SCR-450 SP
Loading Capacity Gallons	45	45	100	100	200	200	300	300
Nominal Hourly Distillation Rate	12-14	18-20	30-40	40-50	55-65	65-75	75-85	85-95
Heating BTU	39,000	55,000	123,000	135,000	153,000	200,000	256,000	270,000
Cooling Water Consumption @ 40° ▲ T	2 GPM	3 GPM	5 GPM	7 GPM	9 GPM	10 GPM	12 GPM	14 GPM
Power Rating (Steam)	—	60 PPH	—	145 PPH	—	215 PPH	—	290 PPH
Power Rating (Electric)	9 KW	—	36 KW	—	45 KW	—	75 KW	—
Installation Area Required	20 Sq. Ft.	20 Sq. Ft.	20 Sq. Ft.	20 Sq. Ft.	28 Sq. Ft.	28 Sq. Ft.	38 Sq. Ft.	38 Sq. Ft.



PROGRESSIVE RECOVERY, INC.

PRI

Progressive Recovery, Inc. ...pioneer, innovator of solvent recovery systems — and more

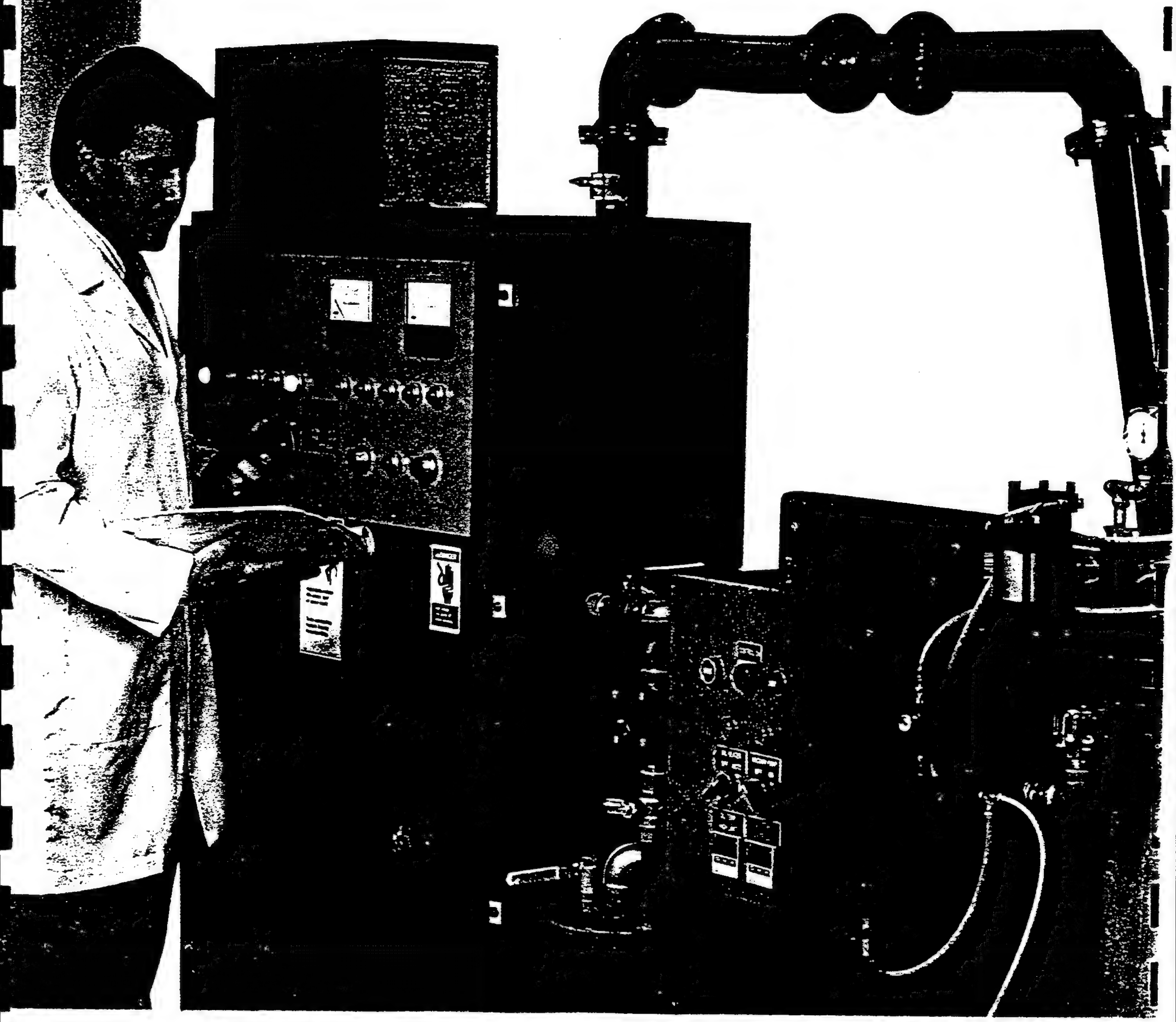
Indiscriminate dumping. Polluted landfills. Contaminated ground water. Potentially dangerous storage. Toxic fumes. Air pollution. Employee injury...All part of the familiar vocabulary of *environmental pollution.* As the problem grows, so do the concerns that accompany it. Add to that list "mounting costs, tighter regulations, and generator liability;" and the picture comes into sharper focus.

More than mere rhetoric, these are the persistant. costly problems you confront routinely — problems that require expert and often unique solutions. PRI has been helping solve such problems for over a decade.

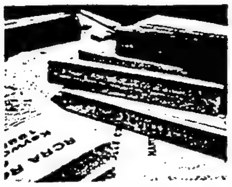
The PRI System

PRI is an acknowledged industry leader in the design, engineering, manufacture, and installation of solvent recovery systems. The PRI liquid system — a sophisticated, efficient, distillation process — converts solvent streams contaminated with inks, pigments, resins, and other contaminated solvent solutions into reusable products.

PRI vapor systems reflect a unique technological advancement in recovery. The concept and design provides the user with maximum emission control.

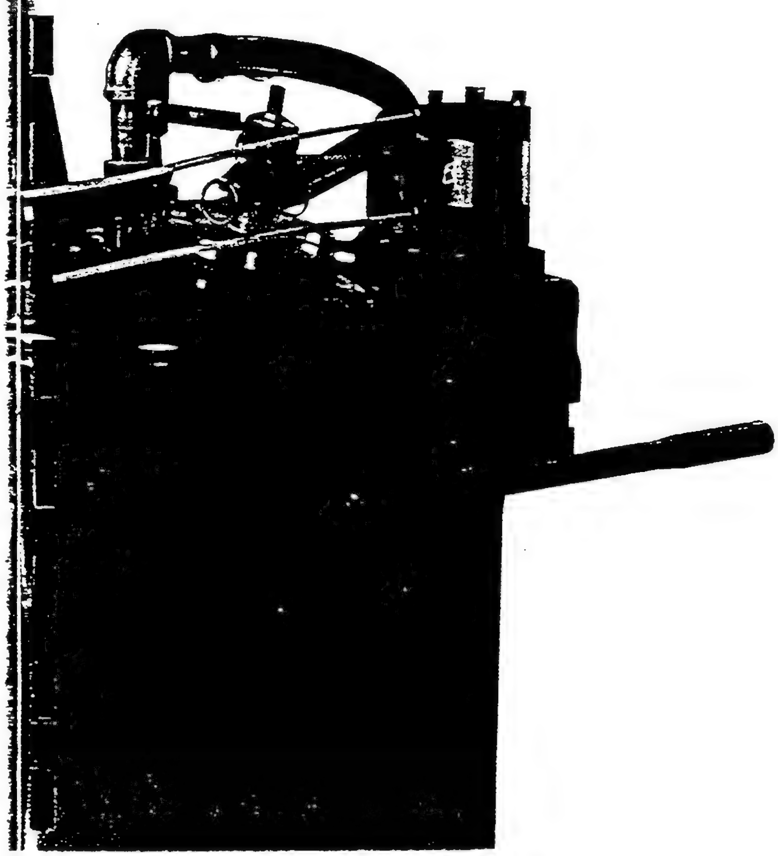


The reclaimed solvent purity or separation can be attained to meet your exact requirements.



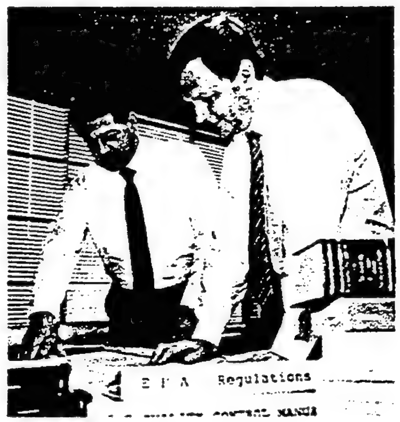
Our manufacturing facilities are located near St. Louis, Mo. There, we build recovery system units in stict compliance with all applicable codes. Fabrication and assembly are scrupulously monitored to assure on-time delivery of the highest possible quality systems. We use reliable, industry-tested components in all of our units, which are 100 percent tested for pressure containiment, safety functions, and back-up system performance.

Because system and installation requirements vary from one customer to the next, PRI will custom design and fabricate a recovery system to your exact needs. We can also modify standard units quickly and economically.



With a PRI recovery system, you will:

- Eliminate or substantially reduce hazardous waste disposal costs.
- Eliminate or minimize potential long-term liability from hazardous waste disposal or employee contact.
- Decrease storage of hazardous materials on site.
- Realize a rapid return on your investment in capital equipment.



- Meet air emission standards.
- Save production costs by recyling reclaimed solvents.
- Be exempt from the required EPA permit (Federal regulation 40, part 261.6).
- Be assured that reclaimed solvents are free of outside contamination.

The PRI Advantage

Our top-flight team of customer-driven engineers, scientists, and technicians combines years of experience and expertise in diagnosing and solving complex solvent waste and emission problems. Going far beyond a consulting role or that of equipment supplier, PRI provides a *total system solution* to every problem.

Equipped to handle every facet of the system — from design to installation of state-of-the-art equipment — we are dedicated to customer service, product quality, and creative solutions to your solvent pollution problems.

Looking Ahead

PRI, long considered an innovator in this rapidly growing technology, believes that the future of our company will depend on the excellence of our products and our people. In the years ahead, we will continue to serve our clients through customized engineering, original solutions to your problems, quality equipment, and timely response and support.

A history developi systems that redu or elimina disposal costs.

Research and Engineering... to analyze the problem and design the solution.

PRI's engineering and research department gives you single source responsibility when you have a problem with solvent-laden liquid or air streams. With our chemical, electrical, and mechanical engineering expertise all under one roof, we combine those disciplines to devise a customized solution to your problem.

Our Chemical Separations division can assess the nature and general scope of your hazardous waste situation through the broad spectrum of chemical analysis, laboratory bench testing, and pilot plant testing. By analyzing a waste stream, we are able to clearly diagnose your problem, formulate a solution, and prescribe a precise system concept to meet your needs.

The Electrical and Mechanical groups take it from there. Our mechanical engineers bring years of experience in applying mechanical systems to hazardous waste problems to the job of converting system concepts into reliable products.

Our electrical engineers play a two-fold role: First, they design a safe and reliable control logic; and, second, they ensure the reliability and safety of the operational control system through utilization of high-quality electrical components.

Together, both mechanical and electrical engineers meet with clients to determine that our total systems approach complies with prescribed specifications.

PRI's engineering and research work hand-in-glove with each other in such problem-solving situations. If our team of professionals determines that standard

products (existing hardware) are ill-equipped to meet the challenge, and that a unique solution is required, they will design and develop the technology and product to meet the challenge.

You Benefit From:

- A custom-designed PRI solvent-recovery system.
- The most cost-effective solution to your problem.
- Single source responsibility, with complete system documentation.
- Reliable operation, with very little need for service.
- Minimal employee contact with hazardous materials, as a result of our closed-loop system.
- Working with the industry leader in solvent emission and recovery systems.

Workabl
solution
result f
integrat
of chemi
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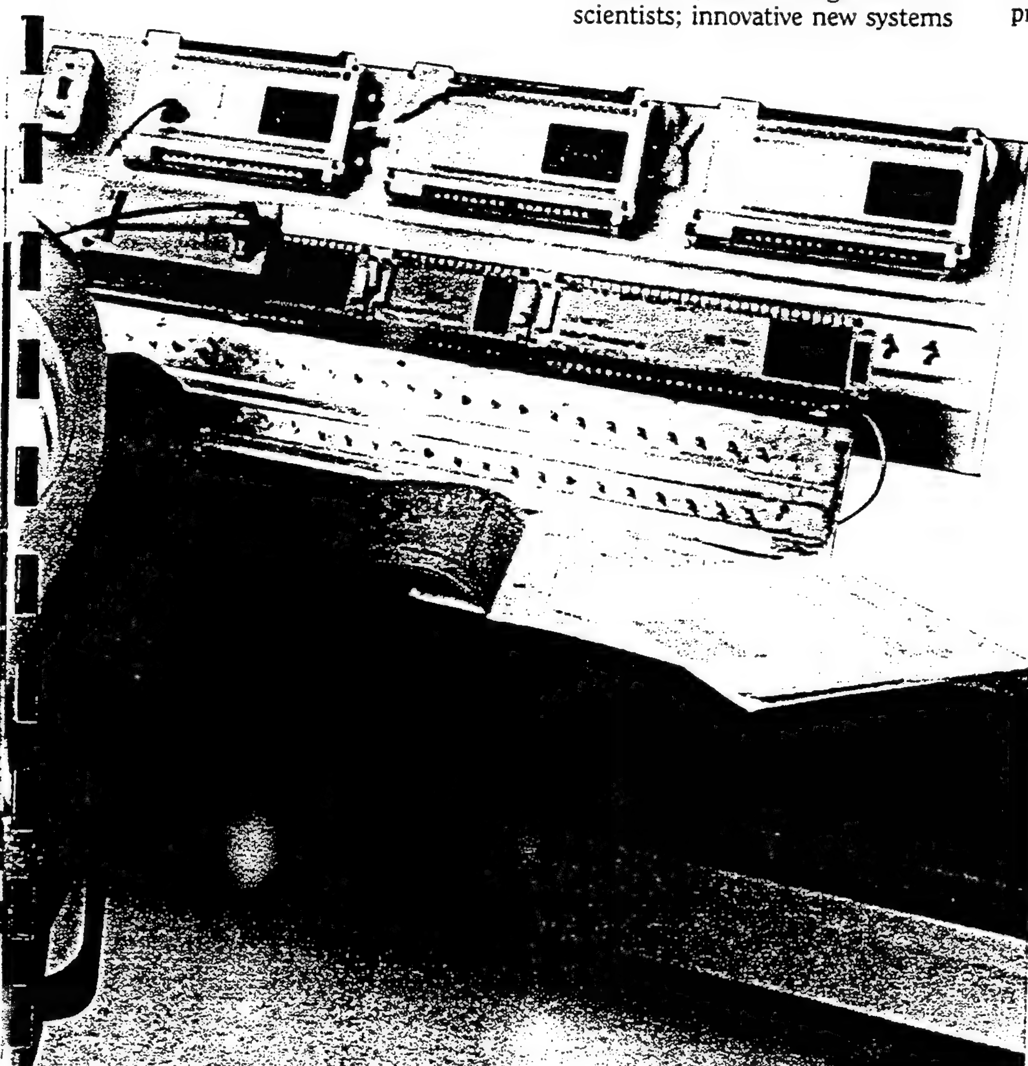
and
electric
function

The PRI Advantage

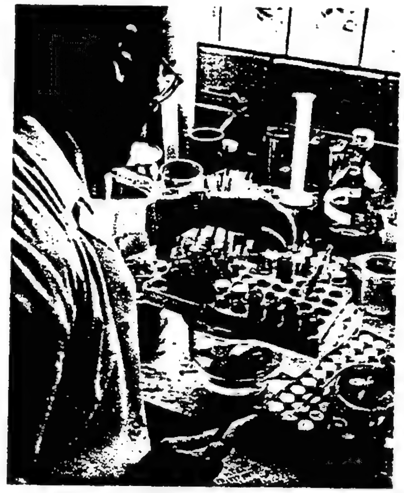
No other company in our industry can offer you what we offer: a staff of seasoned, talented engineers and scientists; innovative new systems to meet complex customer needs; and the creative spirit of our people that reaches beyond existing technology to develop new solutions to liquid waste and emission problems.



PRI-VAC 2000 means solvent waste generators can get delisted.

As a generator of hazardous waste, you face a two-pronged challenge: (1) the federal and state regulations that are constantly lowering tolerated solvent levels; and (2) your own liability, despite your most stringent of precautions. PRI-VAC 2000 is a revolutionary recovery system that *eliminates* solvent content and *delists* the waste for disposal in normal, readily-available, solid waste landfills.

PRI-VAC 2000 combines PRI's solvent recovery expertise with McDonnell Douglas Corporation's specially licensed, "space-age



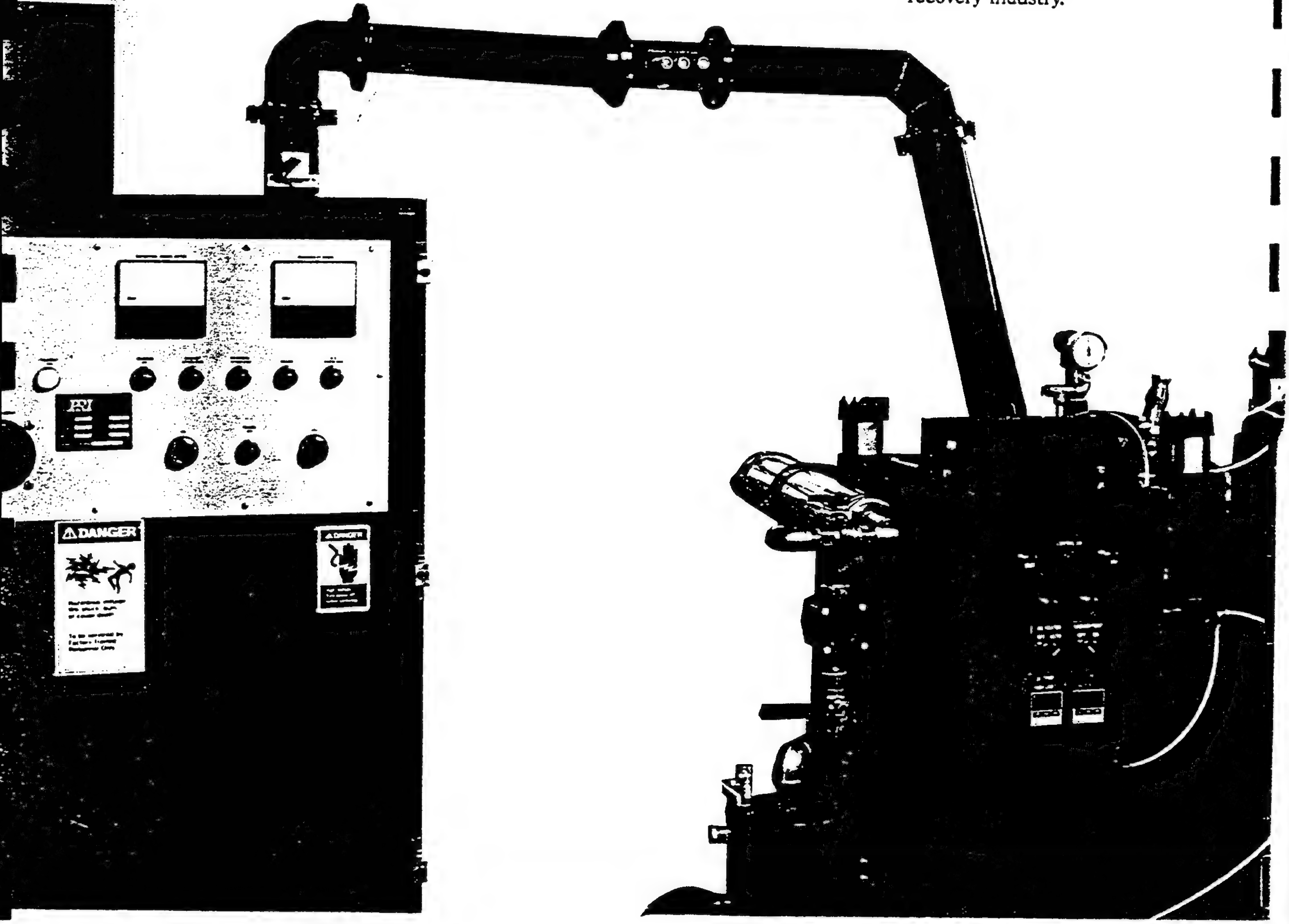
technology." This unique system incorporates conventional heating and microwave sources to remove solvent content to delisting levels.

Solvent recovery units range in size from small and medium applications to those that meet large scale demands. PRI's series LSR, for example, is capable of processing up to 300 gallons per hour.

Serving industries ranging from paint and publishing to metal fabricating and aircraft manufacturing, the configuration of every PRI-VAC 2000 system is project-specific. All control panels are designed and manufactured by PRI. System programming. protective devices, and modular panels for "add-ons" are standard features.

You Benefit From:

- R&D that has established leading edge technology in the solvent recovery industry.



- Complete eradication of hazardous waste.
- Elimination of liability and cost of disposal.
- Guaranteed delisting on a continuous basis.
- Warranties on all equipment and workmanship.

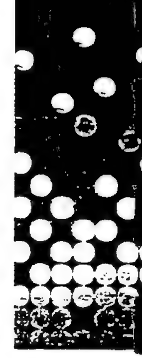
The PRI Advantage

The PRI-VAC system can be used for the reduction of solvent-laden hazardous waste, the creation of a recyclable product, and the actual delisting of the residue.

These unique capabilities of the system are specifically engineered to meet your precise project specifications.

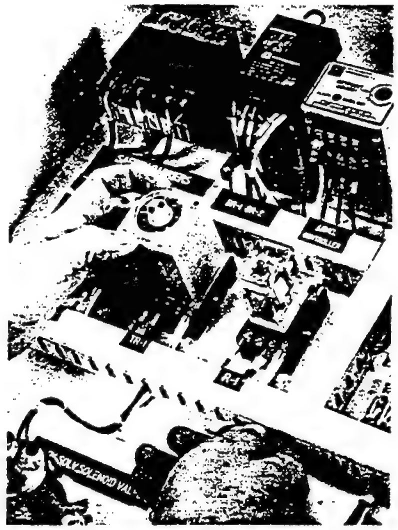
PRI-VAC 2000 is a natural outgrowth of our technological leadership and market-oriented product development. The system is *the* major breakthrough for eliminating hazardous waste on-site — the one existing method of meeting present and future regulatory standards.

Special license brings "space-a technolog to recove systems.



Manufacturing... from electronics to welding, in-house control assures quality.

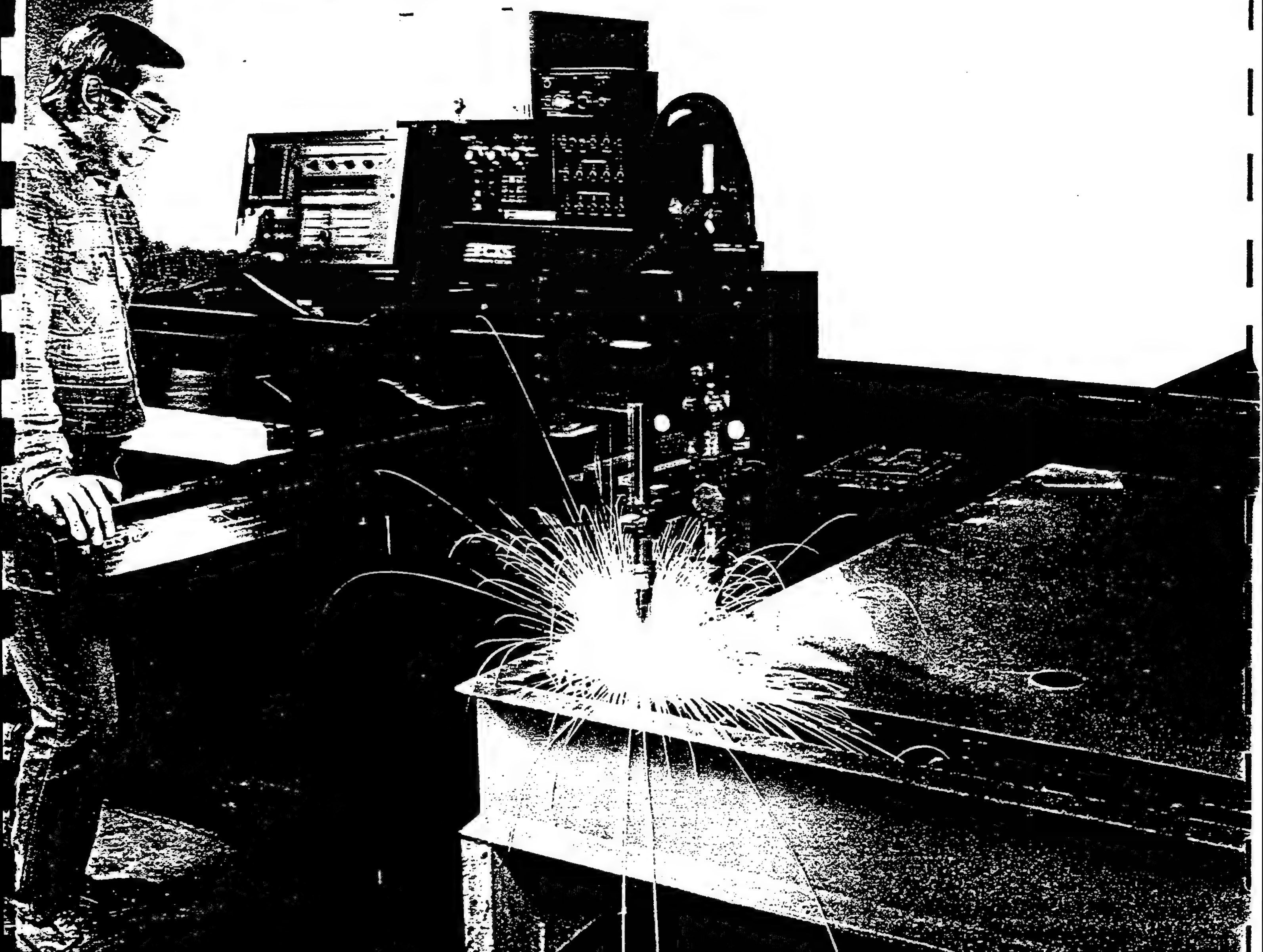
After we have precisely identified your problem and determined an approach to its solution, our Manufacturing group converts engineering designs into a finished product. The manufacturing stage incorporates machining, plasma flame cutting, metal forming, fabrication, component assembly, and final equipment trim/painting.



Each of these varied facets of the manufacturing process are closely monitored to meet strict quality standards.

In producing the final system, skilled technicians mount and wire each control panel to match the sophisticated requirements of the system. The final system goes through a testing program to assess operational status and proper interface of mechanical and electrical components.

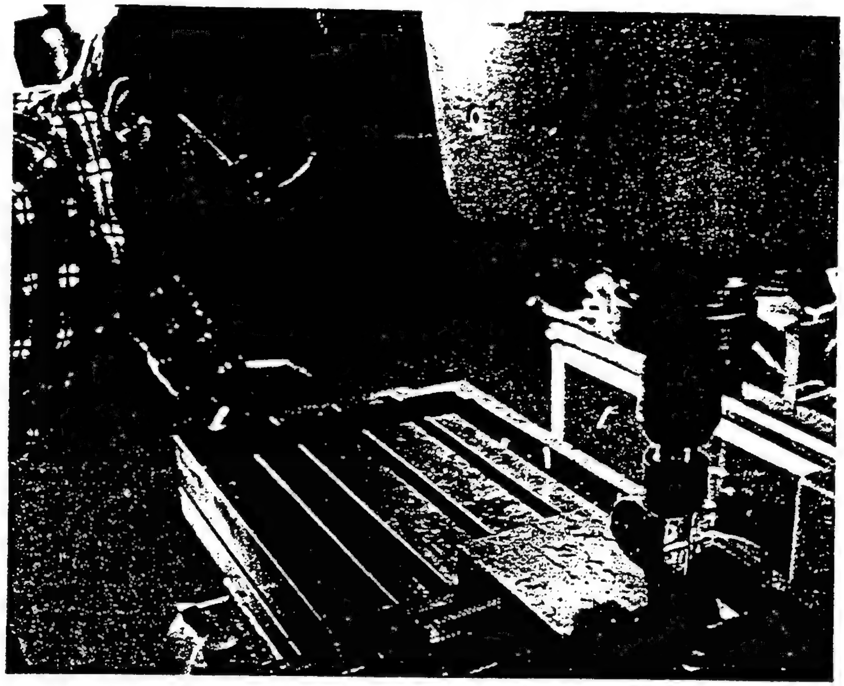
Our fabrication facility is an American Society of Mechanical Engineers (A.S.M.E.) approved manufacturing shop; our electrical assembly department carries the Underwriters



Laboratory (U.L.) stamp of approval. These two approvals provide an authorative third party assurance of all design, fabrication, and testing.

You Benefit From:

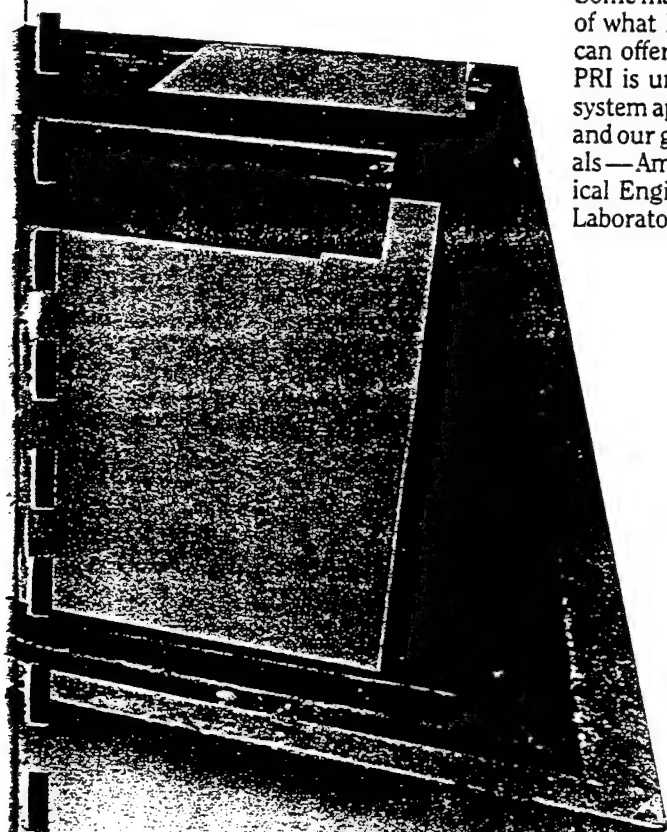
- Single source responsibility for engineering and manufacturing.
- Compatibility of the final product with system design.



- Verification of manufacturing compliance with specifications by scheduled customer visits.
- A.S.M.E. and U.L. inspection, which protects product quality.
- A manufactured product that completely solves your hazardous waste problem.

The PRI Advantage

Some manufacturers offer portions of what PRI provides, but *no one* can offer you the entire package. PRI is unique in our complete system approach to manufacturing and our guarantee of three approvals — American Society of Mechanical Engineers, Underwriters Laboratories and "you" the client.

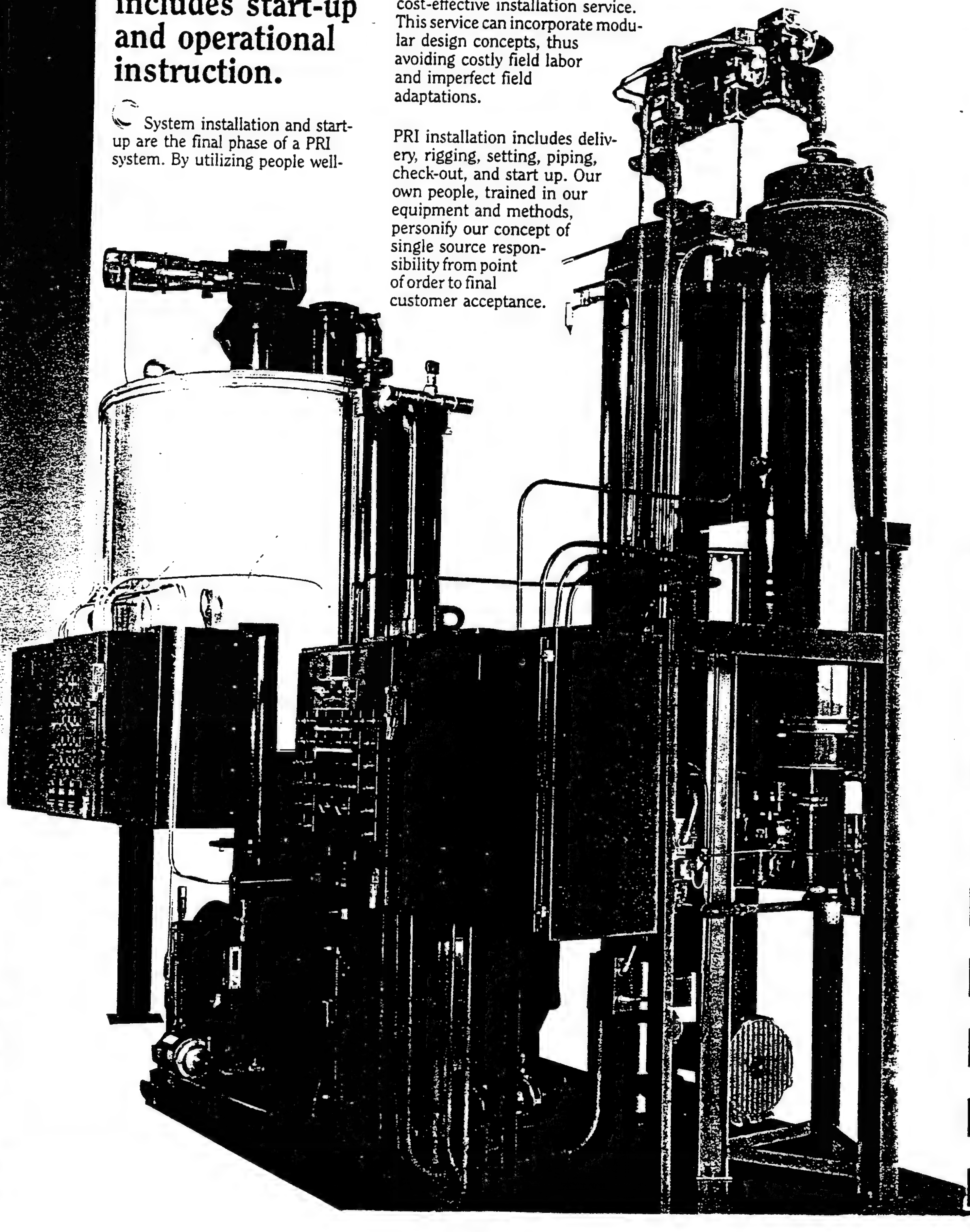


A single fabricati and assemb facility w A.S.M.E. and U.L. approve shops.

A PRI "system" includes start-up and operational instruction.

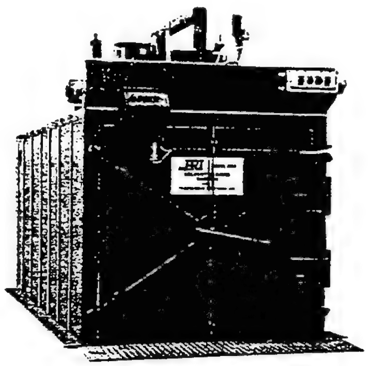
System installation and start-up are the final phase of a PRI system. By utilizing people well-versed in system design and fabrication, we provide rapid, efficient, cost-effective installation service. This service can incorporate modular design concepts, thus avoiding costly field labor and imperfect field adaptations.

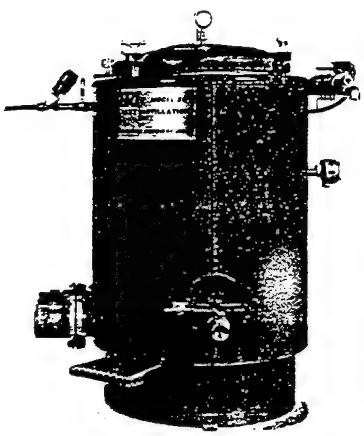
PRI installation includes delivery, rigging, setting, piping, check-out, and start up. Our own people, trained in our equipment and methods, personify our concept of single source responsibility from point of order to final customer acceptance.

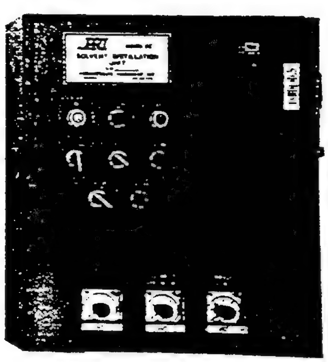


You Benefit From:

- Fast, reliable installation by the designer and manufacturer of your system.
- Proper interface of components by expert installers.
- Custom service by knowledge-able PRI personnel.
- A one-year warranty on materials and workmanship.



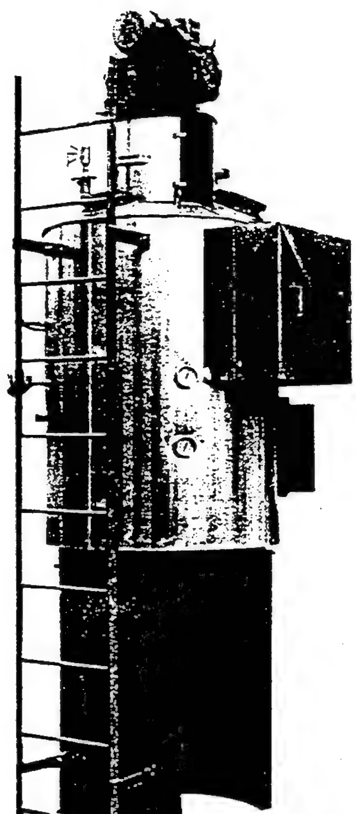




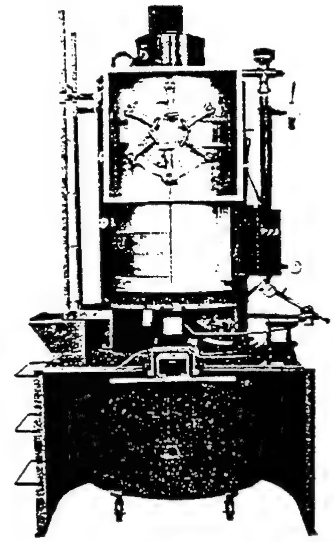
The PRI Advantage

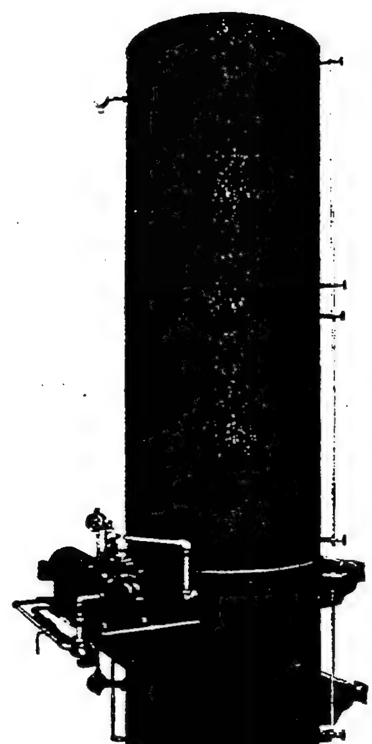
Based on our long experience and expertise with flammable vapors and our utilization of standard codes and accepted practices, we are able to guarantee safe, practical, and insurable installation of any PRI system. Our installation will pass third-party approval for insur-ance and regulatory purposes.

Your system's operation and stan-dard procedures are fully explained and demonstrated by a PRI field engineer. His thorough under-standing of your system provides your operators with a clear knowl-edge of procedures. Additionally, each PRI system is installed with a fully documented operational manual.

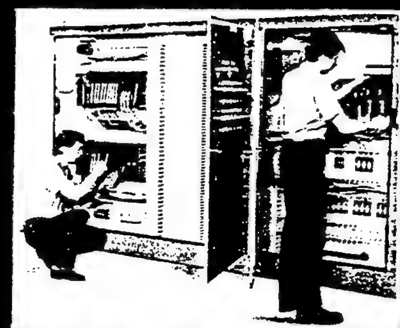


Our trained, efficient personnel will install and start-up your system properly—*the first time.* We assume responsibility for complete system installation and flawless operation of your PRI pollution control system.





No installati is compl without individual operating manual, operator instructio and code complian



PRI

Progressive Recovery Inc.
1020 North Main Street
Columbia, IL 62236
(618) 281-7196
FAX: (618) 281-7930

NOMINATION OF

RED RIVER ARMY DEPOT

SECRETARY OF THE ARMY
HAZARDOUS WASTE MINIMIZATION
INCENTIVE AWARDS PROGRAM

FEBRUARY 1992

NOMINATION OF RED RIVER ARMY DEPOT

SECRETARY OF THE ARMY HAZARDOUS WASTE MINIMIZATION INCENTIVE AWARDS PROGRAM

I. INTRODUCTION

A. Mission/Population: Red River Army Depot is an installation of AMC's Depot System Command. Including tenants, approximately 4,703 civilians and 28 active duty military personnel are employed. The installation, located in Northeast Texas 18 miles west of Texarkana, has approximately 1,400 buildings totaling nearly 8 million square feet.

Historically, Red River has been the only depot with three major missions. The General Supply mission became a tenant as part of Defense Logistics Agency on 1 October 91. Seven of the eleven CONUS divisions and an eighteen-state area are supported by the Area Oriented Depot supply operation.

Approximately 8,000 of Red River's 19,081 acres are utilized for ammunition storage and renovation. Red River is the single source for HAWK missile certified round assembly operations. Readiness monitoring of the PATRIOT and HAWK is another special mission. (Red River was notified that the first SCUD intercept in Israel during Desert Storm was by a PATRIOT bearing a Red River logo sticker.)

Both the Ammunition activity and the third major mission, Maintenance, are involved with the Chaparral weapons systems. Chaparral facilities and equipment at RRAD include millions of dollars worth not duplicated elsewhere within the Army. Another unique mission is Maintenance support to field units for the Cobra attack helicopter armament subsystem.

For the past fourteen years, the primary Maintenance mission of Red River Army Depot has been the total overhaul/rebuild/configuration conversion of light tracked vehicles, including the entire M113 family of vehicles. We also overhaul the M2 and M3 Bradley Fighting Vehicle System. (More than 160 Red River civilian employees were sent to Southwest Asia during Operation Desert Shield/Storm; many of these were involved with maintenance support of the Bradley.)

Rebuild of light tracked vehicles is also the most challenging mission in regard to minimizing hazardous waste generation. The vehicles are disassembled to the bare hull, which is then cleaned and abrasive-blasted. Components and subassemblies are cleaned and rebuilt. Worn rubber is removed from tracks and roadwheels, which are then cleaned to receive new vulcanized rubber wear surfaces. When the hulls and components are restored to like-new condition, they are reassembled and the vehicles returned to field units. Often

the vehicles are reconfigured and made literally better than new. Savings over new procurement are measured in hundreds of thousands of dollars per vehicle; unit savings on rebuild of Bradleys may be measurable in millions. Red River rebuilds about 1,200 tracked vehicles each year. Besides local shop support, the huge and unique Rubber Products facility rebuilds other track and roadwheels for the entire Army.

Between the first steps of disassembly and the shipping of a like-new rebuilt vehicle, there are many potential pollution hazards. Paint stripping involves dangerous solvents, contamination of blast cleaning media (e.g., silica sand) and the removed paint. Metal surface refinishing removes heavy metal coatings; recoating/replating may also be required. Degreasing of mechanical components generates waste grease and dirt, and also involves hazardous cleaning chemicals and solvents. Breaking the bond of rubber and steel with heat generates smoke, particulate matter, and hydrocarbons; the worn rubber removed is nonbiodegradable.

B. Changes in Mission: The main change during 1991, administrative transfer of the General Supply mission to Defense Logistics Agency, had no practical effect on Environmental Management functions. These services are still provided to the new tenant organization and hazards relating to the Supply Mission remain the same.

During late 1990 and January-February 1991, a surge in vehicle and other shipping activity increased associated waste generation. For example, painting many vehicles Desert Sand color generated wastes associated with paint. Since Desert Storm, many retrograde vehicles have been received; outside storage facilities are overflowing and temporary parking lots have been created. This has resulted in increased quantities of waste fuel, crankcase oil, and antifreeze. The above factors, however, only represent unusual workload fluctuations. There have been no basic or quantum changes in mission affecting hazardous waste generation.

C. Organization and Staffing: The environmental management activity is part of the Directorate of Industrial Risk Management which was created effective 1 Jan 91. The Director, who also serves as chief of the Environmental Management Division, reports directly to the installation Commander. Even though three engineers were added to the staff during CY 1991, the activity remains one of the smallest environmental management organizations within Depot System Command. Further modest increases in staffing are anticipated. An organization chart of the Environmental Management Division is enclosed. Managers responsible for industrial safety, law enforcement and security, and fire prevention and protection report to the Director of Industrial Risk Management.

INSTALLATION COMMANDER

DIRECTORATE OF INDUSTRIAL RISK MANAGEMENT

Director	Mr. Lonnie F. Wright	GM-0819-13
Clerk/Steno	Ms. Neva Barron	GS-0318-06

ENVIRONMENTAL MANAGEMENT DIVISION

Supvr Envir Engineer	Mr. Lonnie F. Wright	GM-0819-13
Management Assistant	Ms. Kandy Hirsch	GS-0344-07
Clerk	Ms. Diana Waldrep	GS-0318-05

HAZARDOUS & SOLID WASTE MANAGEMENT BRANCH

Supvr Envir Prot Spec	Mr. Terry L. Funderburg	GS-0028-11
Envir Engineer	Mr. Mike Lockard	GS-0819-11
Envir Engineer	Mr. Kenny Irizarry	GS-0819-11
Envir Prot Spec	Ms. Renita G. Foster	GS-0028-11
Envir Prot Asst	Ms. Debbi K. Smith	GS-0029-06
Motor Vehicle Opr	Mr. Billy W. Tuck	WG-5703-06
Motor Vehicle Opr	Mr. Raven Lewis	WG-5703-06

AIR & WATER MANAGEMENT BRANCH

Supvr Envir Prot Spec	Ms. Carol A. Gannaway	GS-0029-12
Envir Engineer	Ms. Donna R. Renner	GS-0819-11
Envir Engineer	Mr. Mark Crawford	GS-0819-11
Envir Prot Spec	Vacant	GS-0028-11
Envir Prot Spec	Vacant	GS-0028-09

An invaluable complement to the Environmental Management Division is the Environmental section within Maintenance Directorate's Production Engineering Division. This small group, with help from professional Maintenance engineers, monitors hazardous waste management within Red River's highest-volume waste generating mission. The Maintenance environmental section is an invaluable liaison between mission cost centers and Environmental Management Division.

2. BACKGROUND

A. Objectives/Prior Attainment: In 1986, the Department of Defense set a goal of 50% reduction in hazardous waste generation by Fiscal 1992, compared to CY 1985 baseline figures. Red River Army Depot's average generation per year since that time has been 39.2% of baseline (Reference Chart, 3f) with percent of baseline being as low as 24.7% in 1988, exceeding goal only during the year in which the goal was established.

B. OUTSTANDING FEATURES/ACCOMPLISHMENTS, PAST TWO YEARS

more detail

1. Contract obligated for $3.3 million Fluidized Bed for removal of worn rubber from roadwheels and trackblocks. After permit issuance, construction recently began. When implemented, this system will drastically reduce volatile emissions and particulate matter from heat-debonding of worn rubber from steel, and will eliminate tons of solvent contaminated and non-contaminated waste rubber each year.(see pp. 11-13.) The Red River rubber products facility rebuilds roadwheels/track for the entire Army, not just local support. It is extremely cost-effective, but has long been a volume generator of waste rubber, solvents, and other substances.

Questionable

2. An automated hazardous waste tracking system, developed by Red River environmental and systems analyst personnel, became operational in August 1990. The system tracks individual hazardous waste containers from point of origin, meets 3-year data holding legal requirements, and greatly facilitates compliance with hazardous waste management laws and regulations. It has separate menus for waste generator cost centers, location and hazard data for the Fire Department, and tracking data/report capability for Environmental Management. Early in development, other installations and commands expressed interest in the Red River system. During 1991, our Environmental/Systems Analyst team made on-site presentations at installations, MSC's, Army Materiel Command, and Department of the Army. In December 91, they met in Washington with representatives from DA, USATHAMA, Construction Engineering Research Laboratory (CERL) and Army Materiel Command. We have been informed that the Red River system is the cornerstone for an Army-wide standardized program to be implemented in CY 1993.

more detail No longer

3. During 1990 and early 1991, Red River completed a one-year test of a process to reduce generation of caustic sludge and liquids from spent corrosion removal compounds. It was found that addition of sodium gluconate to the sodium hydroxide bath extended solution life and saved labor/downtime to recharge the vats. In addition to lowered operational costs, this process decreases liquid and solid waste generation by 230,000 pounds annually.

more detail

4. For some years, based on local tests, Red River has fought for elimination of the requirement for chromate conversion coating

(Alodizing) of light tracked vehicle hulls prior to application of Chemical Agent Resistant Coating (CARC paint). Red River's tests indicated no appreciable adhesion improvement on sandblasted hulls, and only marginal enhancement of corrosion resistance. Our findings generated controversy. The commanding general of AMC directed independent commercial testing, which began in August 1991. Phase 1 testing supported Red River's claims; Phase 2 corrosion testing is underway. If this requirement is deleted, it will reduce annual dry chromate sludge generation by three tons, reduce personnel exposure to carcinogens, and incidentally save $181,415 per year.

Ed Hammer

5. Chlorinated Solvents Reduction. Depot System Command designated Red River as the Center of Technical Excellence for reduction of chlorinated solvents waste streams. Such solvents, notably 1,1,1, trichloroethane, are used for cleaning/degreasing parts. The CTX group studied state-of-the-art systems, including ultrasonic, fluidized bed, and vacuum degreasing. High-pressure water blast, using non-toxic detergents, was determined best for Red River's needs.(see pp. 16-19). The CG, Depot System Command, then tasked RRAD to quantify requirements for command-wide implementation (which were estimated at $4.4 million) and write purchase specifications. The first full year of DESCOM-wide implementation (CY 93) is expected to eliminate 51,000 gallons of hazardous waste; 109,000 gallons of solvent consumption, and $656,000 in operational costs.

6. A distillation system was installed in 1991; 39,740 gallons of chlorinated solvents were recovered. Environmental personnel performed hundreds of training-instances for individuals and small groups on waste streams segregation, safe handling techniques, use of the automated tracking system, and other aspects of minimization. Research indicated garnet sand would be the optimum blast medium for RRAD's needs (replacing silica sand) and limited implementation began. Other installations have requested our specification for garnet sand, which is being developed in final form. Over 212,000 pounds of oil/fuel were donated to Auburn University for research and academic use; it ultimately will become usable fuel, and the donation saved disposal costs of about $95,400.

delete

Bag furnace Stabilization

C. SUMMARY. Minimization successes in 1991 were primarily due to increased training of generation point personnel, scheduling and inventory control facilitated by our innovative tracking program, and increased on-site and off-site recycling. Our most profound 1990-91 achievements were the foundations laid for dramatic future reductions in generation of waste rubber, solvents, and blast media, and in the impacts Red River is having on other installation and command waste minimization programs.

PCP treated wood pallets

Decon of equipment @ 348

3. ACCOMPLISHMENTS

A. Weight Reduction in Hazardous Waste Generation x 1000 lbs: 472.9

B. Percent reduction from previous year: 15.7%

C. Techniques Employed:

While groundwork was done in 1991 for several new technologies, the reductions actually accomplished during the year at Red River Army Depot were primarily through better management practices, training, recycling, improved storage facilities, and some workload fluctuation. Decreases in blasting media and of paint related material are attributable both to improved management practices and decrease in workload. This decrease is in turn attributable to the late 1990 Desert Shield buildup and subsequent reduction in painting for the sake of color change only.

Installation of a new distillation system permitted recovery of 39,740 pounds of 1,1,1 trichloroethane, saving both disposal and new procurement costs. When chlorinated solvent use is discontinued upon water blast implementation, the still will be used for recovery of other solvents.

The automated tracking system described in B2 above was certainly one of the improved management practices which helped achieve reduction and make accounting more accurate. Six mobile oil tanks were built, and hundreds of supervisors/employees given training in handling, control, stream segregation, and other management practices during the year. Particular emphasis was given to avoidance of cross contamination of diesel fuel and crankcase oil. Storage facilities at two major collection sites were improved to promote waste stream segregation, and individual trained employees were designated as the exclusive handlers of specific items in their cost centers.

D. Cost/Benefit Economic Analysis.

The following table shows adjusted comparative 1990-1991 quantities generated, in category order as listed in the Annual Report.

REPORT CATEGORY	1990 Lbs Gen	1991 Lbs Gen	Plus or Minus	Difference in $ Saving	Penalty
IWTP Sludge	300,628	34,342	-266,286	$52,026	
1,1,1 Trico	166,086	82,874	-83,212	$56,584	

Safety Kleen	470,185	583,703	+113,518	Incl in Svc Cont	
Ignitables	60,742	4,246	-56,496	$28,248	
Metal Finish	310,024	316,121	+6,097		$2,439
Paint Waste	400,576	318,648	-81,928	$40,964	
Blast Media	1,111,686	979,109	-132,577	$50,379	
Paintstripping	41,370	62,919	+21,549		$6,465
Activated Carbon	0	135	+135		$135
Regulated Oil	213,804	87,940	-125,864	$27,690	
Fuel Filters	0	8,790	+8,790		$43,950
Battery Acids	4,264	4,254	-10	$5	
General Acids	5,807	5,037	-770	$216	
Photo Wastes	1,998	8,364	+6,366		$5,093
Downgraded Supply Materials	1,248	49,039	+47,991		$23,996
				$256,112	$82,078

E. Copy of Installation Annual Hazardous Waste Report included as final appendix, page 20.

F. Waste Generation/Disposal Data for Last Five Years:

YEAR	DISPOSED	GENERATED	PERCENT OF 1985 BASE
1991	2,552,000	2,545,527	40%
1990	3,964,962	3,018,418	47.5%
1989	1,322,263	2,092,263	32.9%
1988	1,569,836	1,569,836	24.7%
1987	2,119,936	2,119,936	33.3%
1986	3,587,966	3,587,966	56.4%

1985 BASELINE: 6,352,893 pounds.

G. Installation Restoration Activity: Not Applicable.

H. Relations With Regulatory Agencies/Other Federal Agencies: Required reports and certifications are regularly provided to Environmental Protection Agency, and a good working relationship exists, although informal contacts are infrequent. The agencies with which we have the most day-to-day contact are the Texas Water Commission and the various Army higher headquarters. Excellent working relationships are maintained. Red River environmental management personnel frequently contact TWC representatives informally for interpretation of regulatory requirements or advice on specific problems.

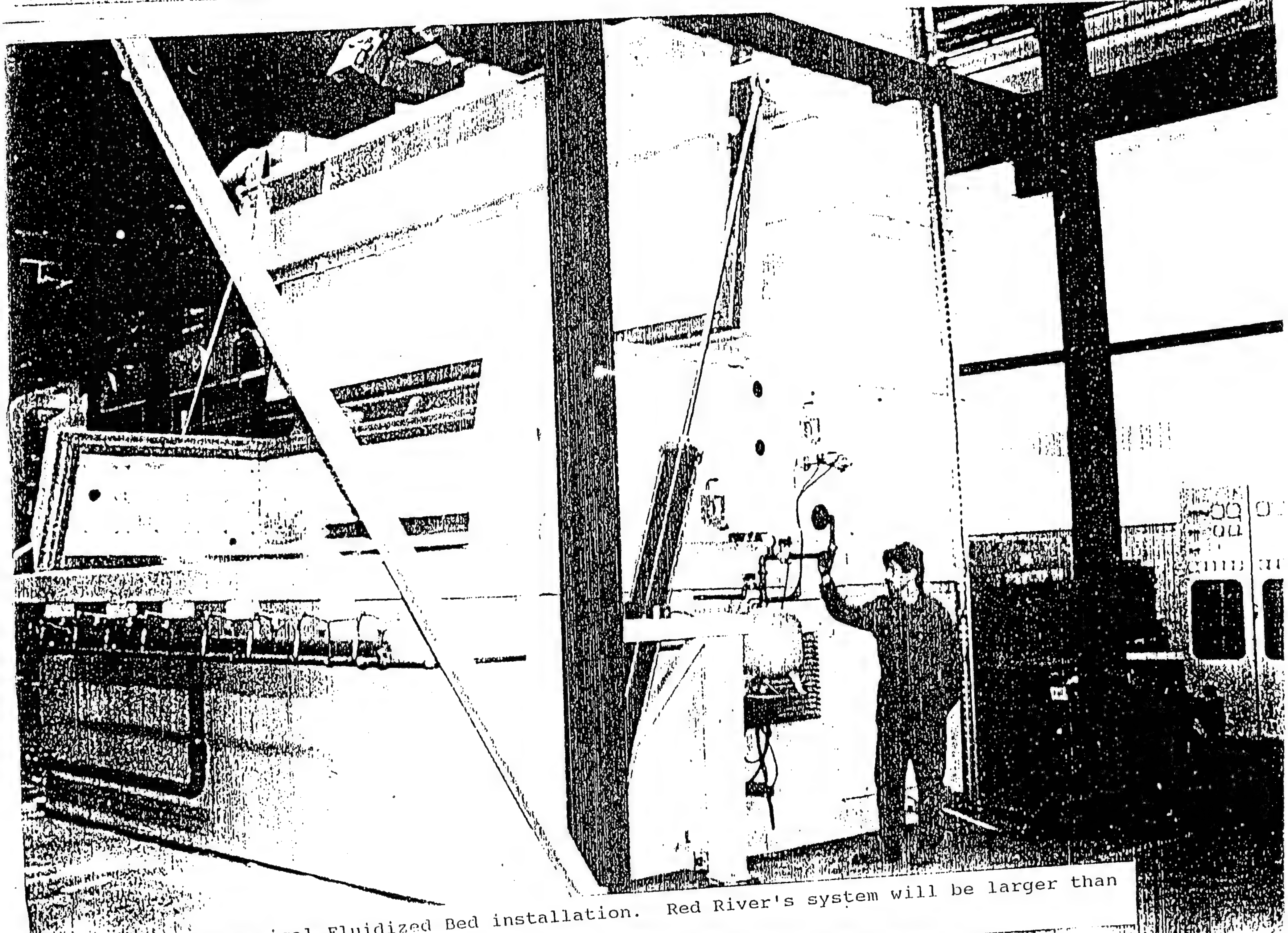
Through Red River's involvement with creating standardized specifications for DESCOM-wide water blast cleaning equipment, our efforts to eliminate unnecessary chromate conversion coatings and silica sand as a blast medium, and through the export of our automated hazardous waste tracking system, we have many informal contacts and requests for assistance. These requests come from installations, our own and other major subordinate commands, AMC, and DA agencies. The tracking program has been the subject of meetings with Construction Engineering Research Laboratory and U. S. Army Toxic and Hazardous Materials Agency personnel, as well as DA and Army Materiel Command representatives. Mr. Edward R. Hanna, a Red River engineer who has been nominated for an individual award, has made presentations on chromate coatings, chlorinated solvent reduction, and other environmental matters to the Joint Depot Environmental Panel at Wright-Patterson Air Force Base, Ohio; the AMC HAZMIN Conference in Orlando, Florida; and the AMC School of Engineering and Logistics.

FLUIDIZED BED TECHNOLOGY

Besides rebuilding track blocks and roadwheels for the vehicles we overhaul here, Red River Army Depot renovates track components from other vehicles to supply much of the entire Army's replacement needs. The process includes removal of worn rubber (rubber denuding), cleaning, painting, and vulcanization of new rubber to the shoes and wheels. Removing the old rubber is the hard part. Historically, three methods have been used: induction heating, salt bath, and turning roadwheels on a vertical turret lathe. The induction heating system electrically heats the track to a temperature which breaks the rubber/metal bond, permitting mechanical removal. The salt bath system immerses trackblocks and steel roadwheels in a hot molten mixture of sodium and potassium nitrates. After this immersion, the rubber either falls off or is easily knocked off. The third method, used on aluminum roadwheels, combines lathes and degreaser vats. After most of the rubber is chiselled off with the lathe cutting tool, the wheel is placed in a chlorinated solvent degreaser until the remnant dissolves or falls off. All three methods are slow, messy, and labor intensive; all generate hazardous waste and emission.

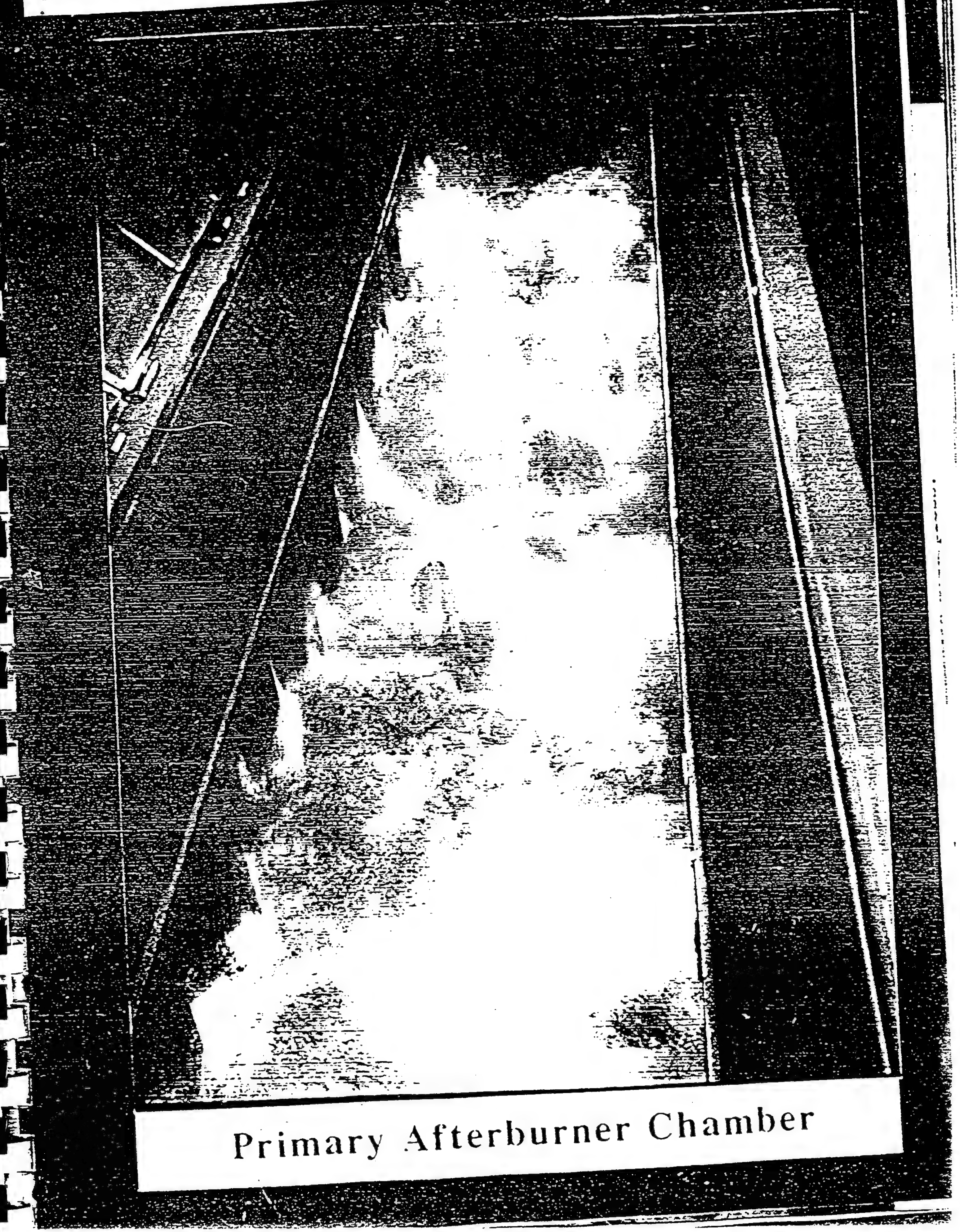
Fluidized bed systems consist of a tank filled with quartz sand. The sand is made fluid by injecting air into the bottom of the sand bed. Natural gas is then introduced to mix with the air, forming a flammable mixture. The mixture is ignited at the surface; flame spreads evenly across the top. Because of the large effective contact surface of the sand mass (and excellent heat transfer qualities) the sand quickly reaches about 950 degrees F. At this point, any rubber within the fluidized sand mass is converted to a gas within the sand bed. As that gas rises, it is ignited immediately above the bed surface in a primary afterburner. The gas stream is routed to a secondary afterburner and heated to about 1560 degrees F. for about 1.5 seconds, with oxygen introduced to assure maximum combustion. To remove sulfur from the stream, fine hydrated lime is then injected above the sand bed. Gases from the afterburner are routed through a heat exchanger for cooling, then to a baghouse filter for removal of particulate matter before exhausting to the atmosphere.

The fluidized bed system appears to be the optimum way to remove rubber from vehicle track blocks and roadwheels from the standpoints of pollution prevention, cost effectiveness, and employee safety.



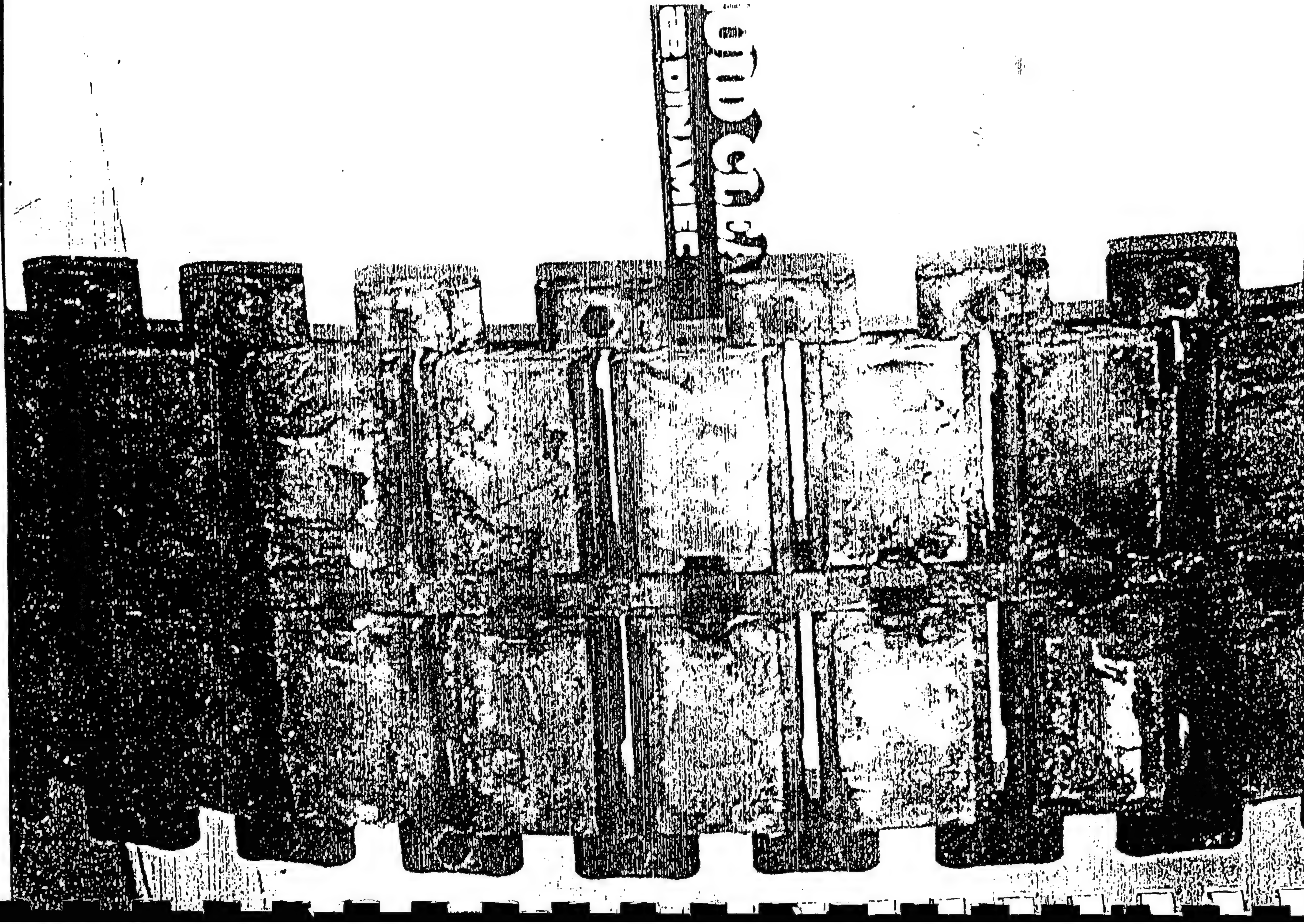
A typical Fluidized Bed installation. Red River's system will be larger than [illegible] illustrated.

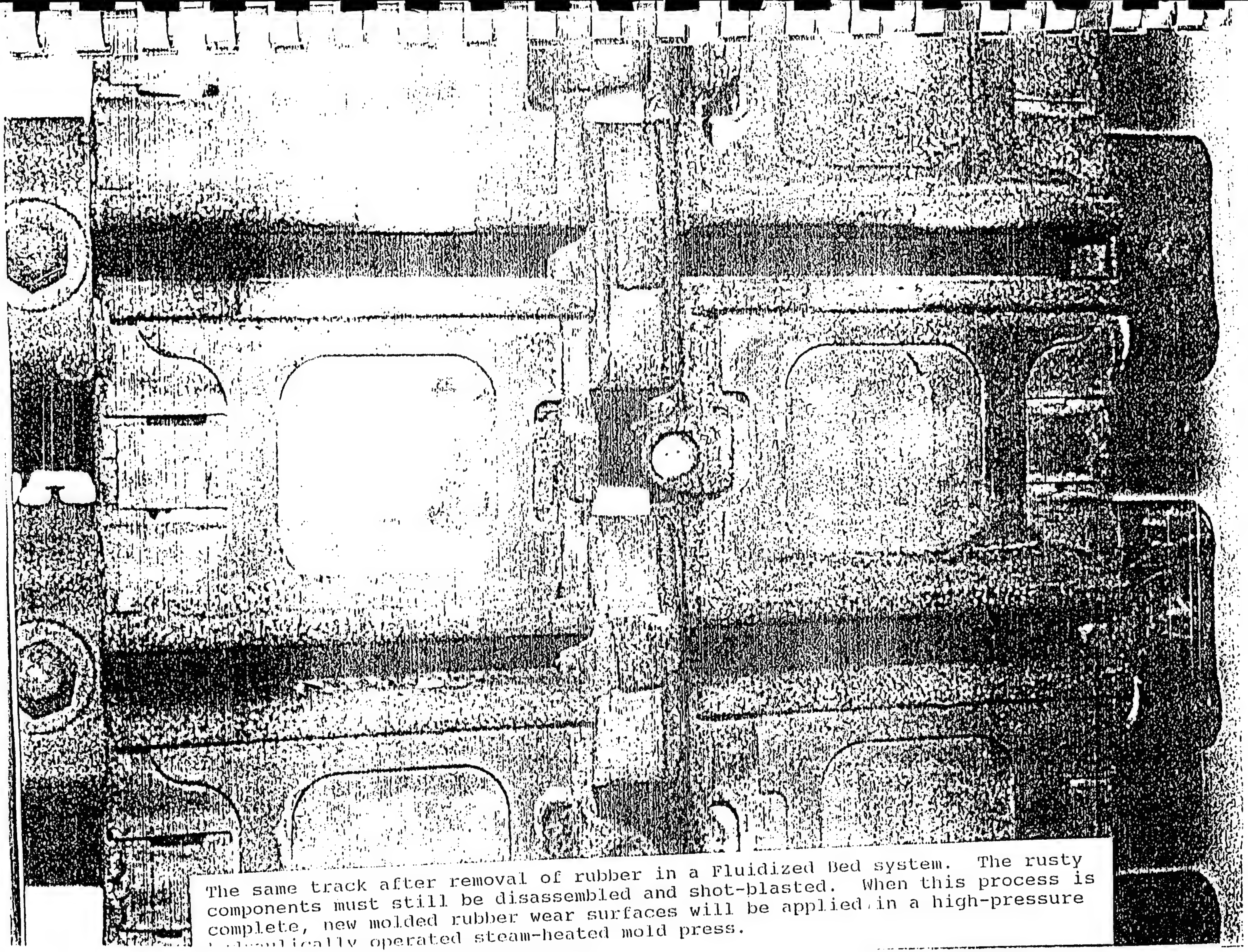
properties of a fluid.



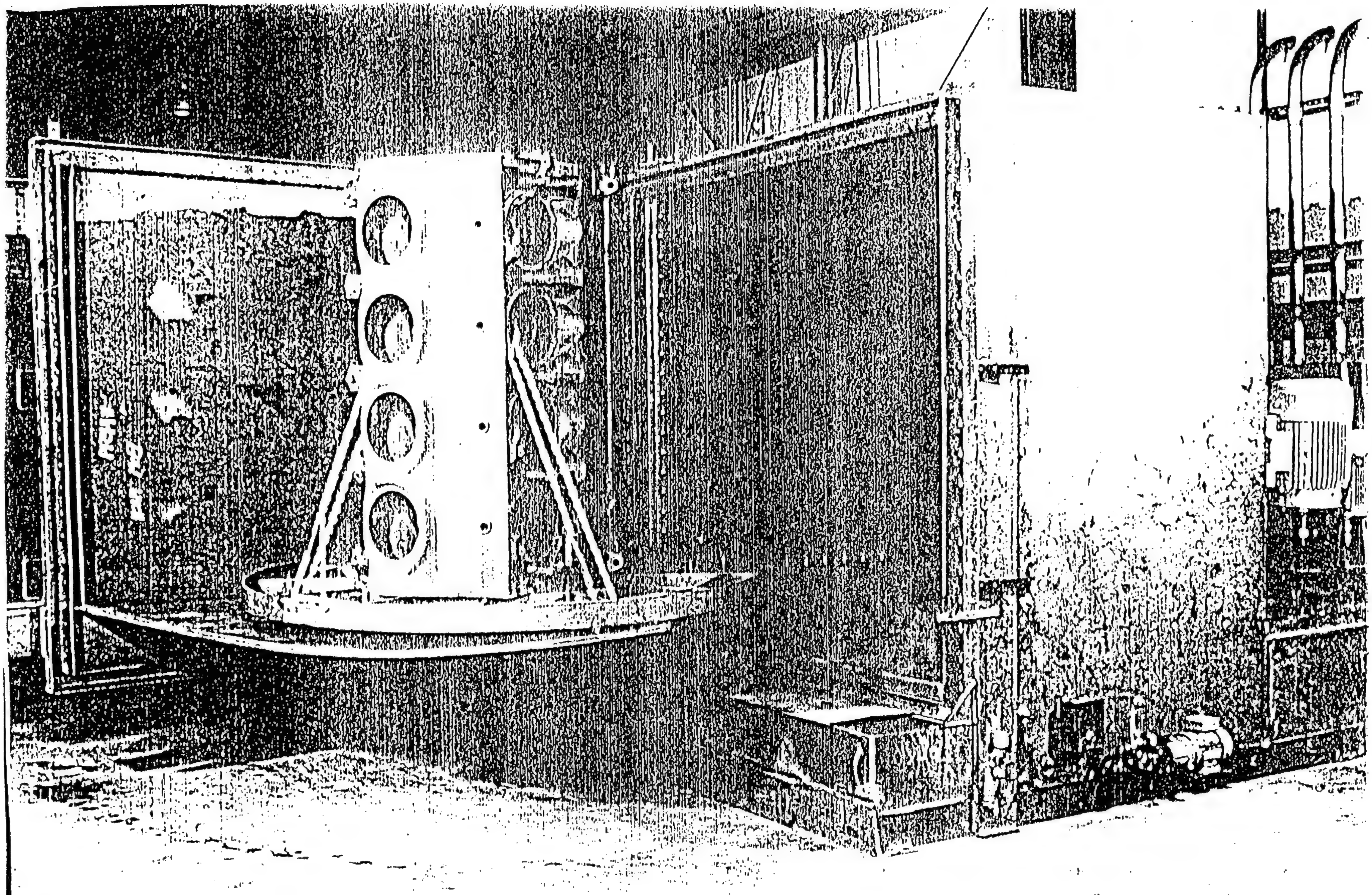
Primary Afterburner Chamber

A section of track with worn-out bonded rubber wear surfaces.

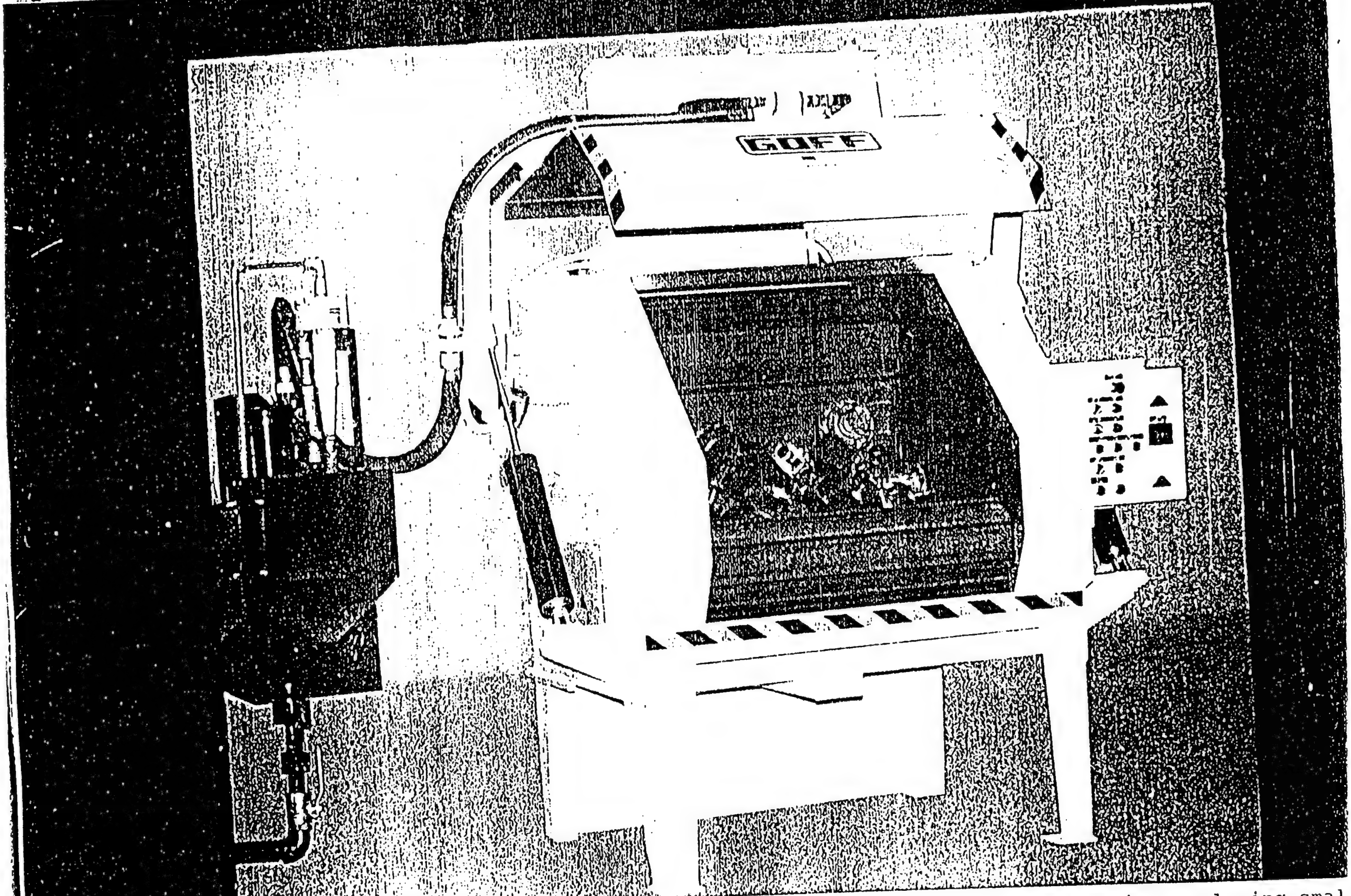




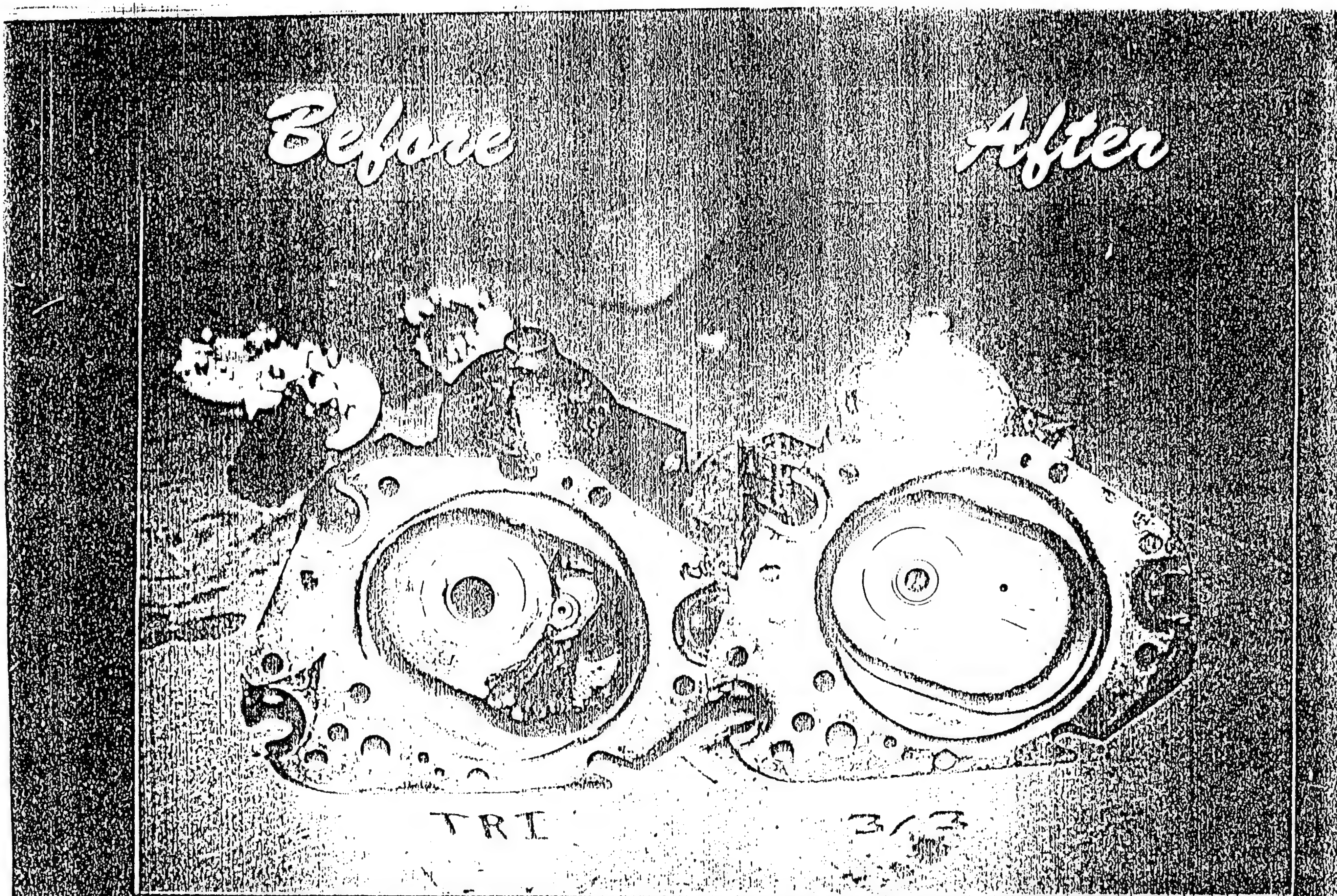
The same track after removal of rubber in a Fluidized Bed system. The rusty components must still be disassembled and shot-blasted. When this process is complete, new molded rubber wear surfaces will be applied in a high-pressure [illegible]lically operated steam-heated mold press.



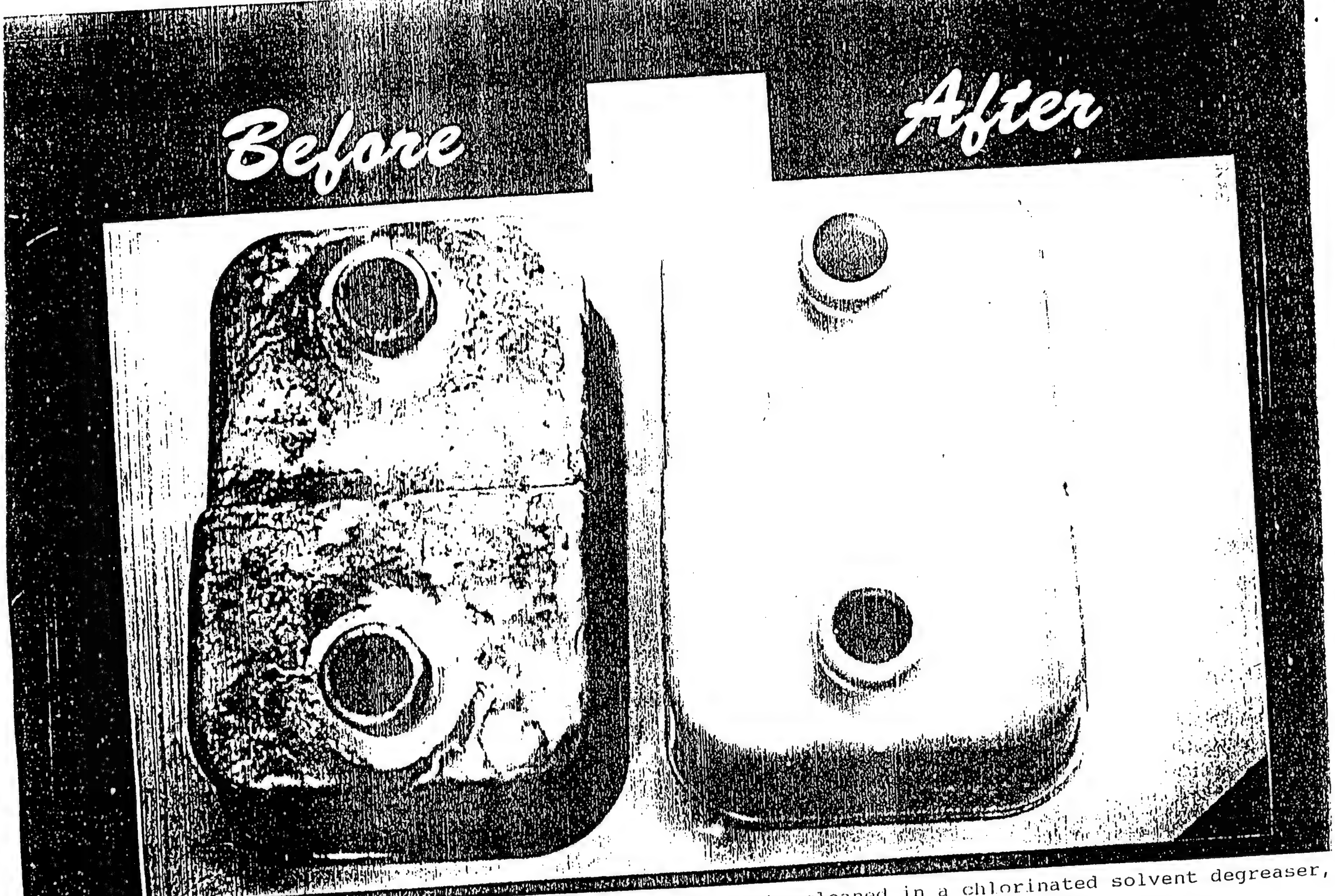
A spin-table high-pressure water blast cabinet. Item being cleaned is diesel locomotive engine block. Similar equipment will replace large chlorinated solvent degreaser vats.



A tumble-type high-pressure water blast cleaning unit, replacing smal trichloroethane (chlorinated solvent) degreaser.



The component on the left was incompletely degreased in a chlorinated solven degreaser; the one on the right was cleaned by high-pressure water and detergent blasting.



This plastic part could not be cleaned in a chlorinated solvent degreaser, but is unharmed by high-pressure water blast cleaning.

AMC
Tobyhanna AD

The following literature is in reference to:

Project #	Project Title
28	LP/HV Paint Spray Systems

#28 ASKED FOR [redacted]

TURBO SPRAY SYSTEMS
TURBO-DYNE IV (L.P.H.V.) TURBINES
AS MANUFACTURED BY CAN-AM ENGINEERED PRODUCTS, INC.

WHY TURBO-SPRAY?

In response to the heightened concern for a reduction in overspray and solvent pollution, coating manufacturers have developed an increasing number of new coatings (some of which are difficult to apply by spray). There is also more concern for worker safety from both industry and government. The result has been a challenge to spray equipment manufacturers to find a better means of complying with these changing conditions. Turbo-Spray Systems challenged these evolutionary changes and has met the new spray requirements for spraying these surface coatings, as well as spraying the old line coatings more efficiently.

INTRODUCTION

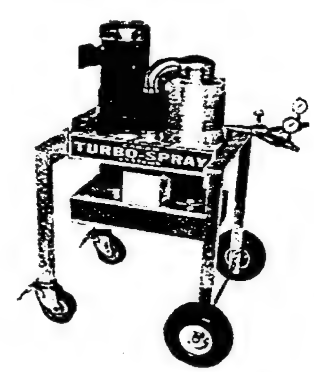
Can-Am/Turbo-Spray Systems Division offers you the finest engineered (dynamically balanced) powerful turbines and spray gun designs available, coupled with extremely high quality materials, and service which is necessary for the North American businessmen's demand for reliability and repeatability.

Can-Am offers you precision equipment that can be installed as a floor mount, mobil or centrally piped wall mount system. Centrally piped systems can be valved throughout 125 feet of your painting area.

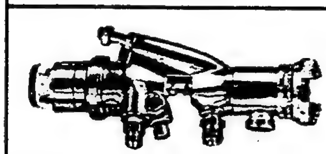
Can-Am/Turbo-Spray Systems offers (patent pending) spray guns especially designed to fit all types of work being performed. Comfort and balance were our key considerations for either large or small hand sizes of men and women. These industrial spray guns are specially designed to deliver High Volumes of heated air at very Low Pressures, which enhances transfer efficiency. The Atomization of Solid and Metallic paints is achieved through the low pressure deliveries (2-7 pounds per square inch) and high volume (60-270 cubic feet per minute) of air delivered by the (patent pending) Can-Am/Turbo-Spray Systems Turbine system.

The Can-Am/Turbo-Spray system has also incorporated an all new (Patent Pending) Dyne-A-Float silencer stand. The powerful Turbo-Dyne IV turbine coupled with our Dyne-A-Float silencer stand produces decible readings below 80DB at a three foot distance. The 80DB level is well below O.S.H.A. industrial requirements.

Heavy-Duty Mobile Unit

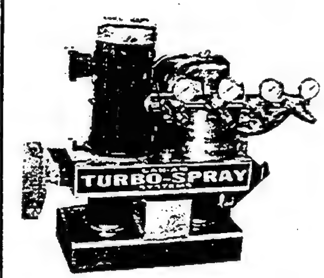


Precision Manufactured Hand Spray Guns with Rear Fan Controls



Manual or Off-Station Controlled Automatic Spray Guns with Quick Color Change Capability

Heavy-Duty Wall Mount Unit



CAN-AM HAS VAST EXPERIENCE WITH THE INSTALLATION OF L.P.H.V. SYSTEMS THUS OFFERING OUR CUSTOMERS KNOWLEDGE UNMATCHED THROUGHOUT THE WORLD.

COATINGS CAN-AM HAS APPLIED WITH OUR L.P.H.V. SYSTEMS

Acrylics • Alkyds • Vinyls • Teflon • Polyester • Water Base • Textures
Shield Coatings • Body Shop Primers • Body Shop (solid and metallic) Colors • Urethanes
70.0% Volume Solid Polyesters

WHAT CAN WE DO FOR YOU? . . . WE WANT YOUR BUSINESS!

FORM #TS-1 Rev.

EQUIPMENT PERFORMANCE YOU CAN EXPECT FROM CAN-AM/TURBO-SPRAY SYSTEMS DIVISION:

- 50 % lower operating costs.
- 20-70 % lower material usage.
- Production speeds equal to conventional air spray equipment.
- Clean, warm, dry air with no contamination and less blush or whiting from fast dry lacquers on high humidity days.
- Rapid solvent release resulting in faster dry times. In the case of mask painting, 50-150 % longer shield life prior to mask cleaning necessity.
- Overspray and bounceback are greatly reduced.

FEATURES AND PRINCIPLES

LOW PRESSURE - The Turbo-Dyne IV, turbo-compressor produces an air flow at a very low pressure (1-8 psi at the spray gun). Because the spray gun constantly bleeds turbine produced air there is no sudden expansion of the air coming out of the spray gun, as with conventional air or high pressure systems where the explosion produces a paint fog or the pressure produces bounce back. This benefit is twofold: 1) a significant savings in material as there is just enough pressure to lay the paint on the surface; 2) a significant reduction in overspray as the solvents are not misted at the gun, thus the transfer efficiency is greatly improved.

LARGE VOLUME OF AIR - In contrast to a normal compressor, the Turbo-Dyne IV, Turbine delivers a large volume of air (from 40 to 270 CFM) directly and continuously to the spray gun. Thus the working turbo provides a large volume of air at a constant pressure.

HOT AIR - The turbine, running at high speed, compresses the air through a restricted orifice and then allows the hot air to expand naturally. Through each stage of the turbine, the temperature increases, until it leaves the turbine at temperatures 130-190° F above the ambient. This hot air has the important benefit of being free from both moisture, condensation and oil.

DRY AIR - As the air expands in the Turbo-Dyne IV, Turbine, the relative humidity decreases. The amount of moisture reduction varies with the pulley combination selected.

LOW SOUND LEVELS - Because of our concern for O.S.H.A. industrial noise level standards and likewise workers' safety, Turbo-Spray Systems developed a completely new Turbine mounting stand called Dyne-A-Float. This Dyne-A-Float mounting stand incorporates noise suppression which reduces the turbine sound levels to below 80DB at a 3 foot distance.

SPEED OF APPLICATION - Because of Turbo-Spray Systems powerful Turbo-Dyne IV, Turbine application equipment, which utilizes large volumes of air to break up the fluid stream, we are able to apply fluids at rates up to 1700 C.C. per minute. This coupled with the utilization of fan sizes of 2 inches to 14 inches, increases spraying speeds.

LOW ENERGY CONSUMPTION - Turbo-Spray Systems' Turbo-Dyne IV, Turbine energy consumption is probably the lowest on the market. The electrical requirements per gun range from 1.37-1.87 H.P., depending on the amount of guns being used.

ADDITIONAL BENEFITS - The turbo produced air vein provides additional benefits. As soon as the paint leaves the fluid nozzle it enters the warm air vein and is carried to the surface. The result of this is a paint which flows well onto the target surface in a single pass replacing several required by a standard conventionally compressed (cold air) system without the risk of runs and sags. Also it acts like an extension that permits paint to be aimed into corners and hard to reach recesses to assure coverage without the build-up or runs on the sides. By projecting the hot air vein at a regular speed from a normal distance (8"-12") penetration on irregular surfaces is complete.

In addition, the hot air speeds the evaporation of the solvents on the surface by momentarily bathing the painted surface in warm air. This favors a superficial tension giving a brilliant, even finish in addition to the shorter drying time. Using such low pressures the solvents are not misted at atomization, but are carried to the surface where they perform their proper function.

As a result of our low pressure output, the orifices of our #900 Turbo-Spray guns can be large. This will reduce down-time costs due to clogged tips. Low pressure also allows even a novice sprayer results like a professional. In short, the main points of the Turbo-Spray System are:

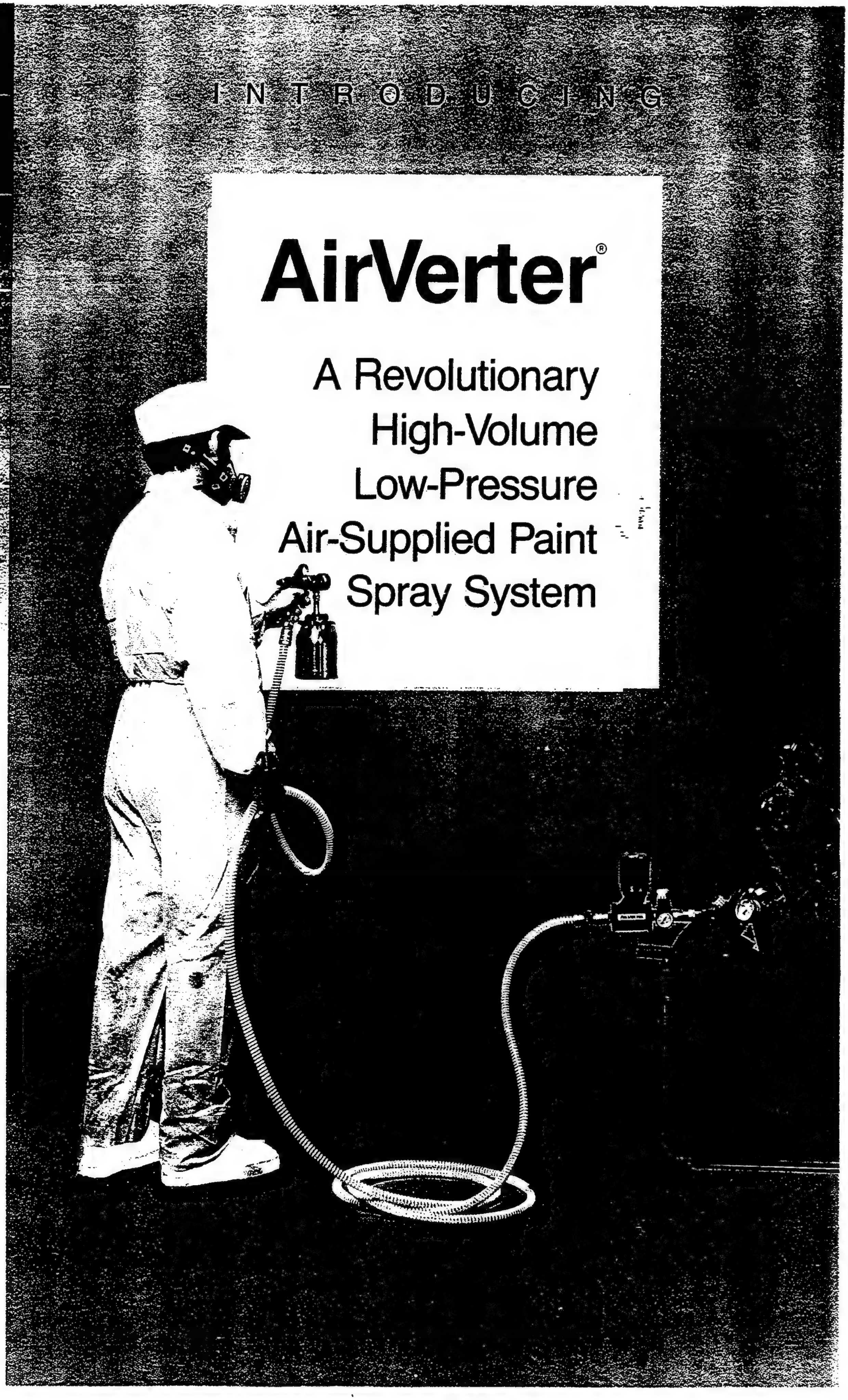
I. **ANTI POLLUTION**
  a. Saves from 25-70 % in paint, thus reduces EPA's pollution concerns.
  b. Greatly reduces overspray and fog for a cleaner work environment.
  c. Reduces the amount of make-up air needed for savings in heating fuel.
  d. Transfer efficiencies reported ranging from 60-80 % depending upon the job being performed.

II. **UNIVERSAL APPLICATION**
  a. Sprays any paint
  b. Found in all type industries.
  c. Skilled labor not needed. Laborers quickly voice their approval due to ease of spray and lack of back spray.

III. **LOWER COSTS**
  a. Initial investment low (when compared with pay back periods).
  b. Inexpensive upkeep **(one year warranty).**
  c. Fewer rejects by the absence of oil and moisture.
  d. Less maintenance and down-time (due to modern technology).

TURBO-DYNE IV and **DYNE-A-FLOAT** are trademarks owned by Can-Am.

30850 Industrial Road • Livonia, Michigan 48150 • (313) 427-2020 • Out of State 1-800-435-7551


INTRODUCING
AirVerter®
A Revolutionary
High-Volume
Low-Pressure
Air-Supplied Paint
Spray System

▪ Military ▪ Defense Contractors ▪ Rental Centers ▪ Commercial/Institutional Maintenance ▪ Metal Fabricating ▪ Plant Maintenance ▪ Consumer ▪ Marine Industry ▪ High Steel Structures ▪ Aviation ▪ Auto Industry ▪

U.S. Armed Forces
Defense Contractors

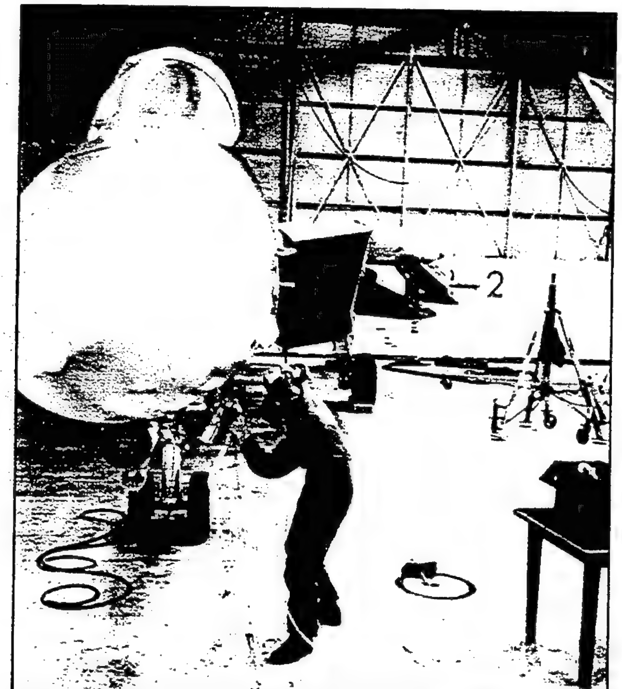
"We have been testing a low-pressure air averter paint system that we believe to be far superior to anything currently in use..."

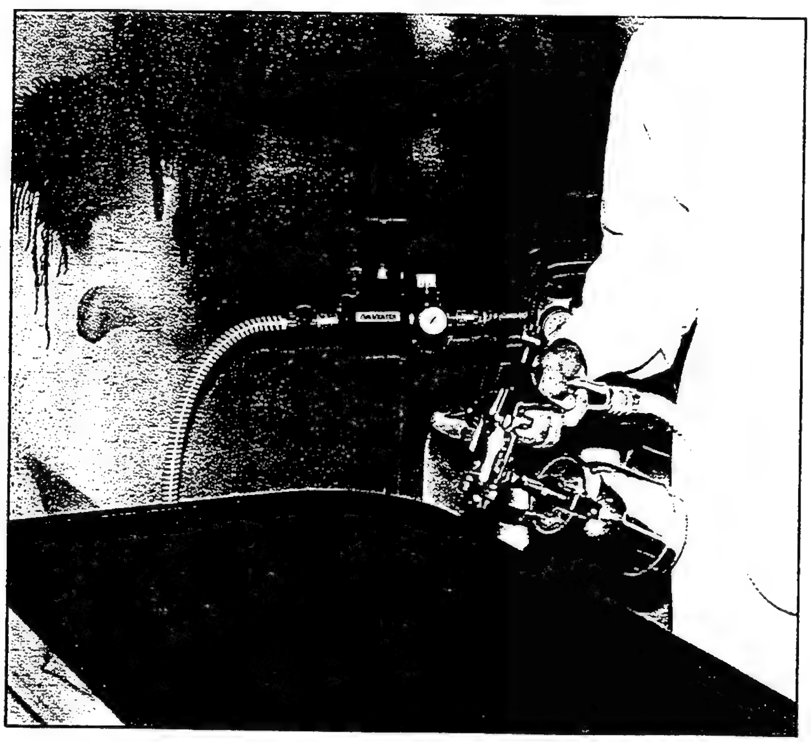
"Test results revealed a 45-percent reduction in the consumputon of paint, a 50-percent reduction in overspray and a 50-percent reduction in the emission of VOCs to the atmosphere. A better product was realized in all cases."

"It enables a relatively inexperienced painter to produce results equal to that of our experienced painters..."

"The use of a paint spray system that reduces overspray and VOC emission...is becoming absolutely essential due to the tightening of EPA restraints..."

– Department of the Air Force
Report copies upon request


Navy planes being painted with the AirVerter® paint system.



Top Rental Centers

"The AirVerter® has helped Rental Tools & Equipment save time and money and improve the quality of our paint finish. The biggest advantage is the tremendous reduction of overspray. We save money on paint, there's less clean-up and the quality finish is 100 percent better than a conventional paint gun. We get full coverage on the first pass.

"We use the AirVerter® for all jobs – minor and major."

– LeRoy Hoyer, Vice President
Rental Tools & Equipment
Bladensburg, Maryland

AirVerter®

- Meets The Quality Standards Of Conventional Paint Systems
- Uses Free, Clean, Ambient Air From The Atmosphere
- Reduces Overspray And VOC Emissions By More Than 50% Compared To Conventional Systems

- 85% Transfer Efficiency
- Reduces Cost Of Painting
- Paints Finished Coat On First Pass
- Portable
- Simple Clean-Up And Easy Maintenance
- Paints Small Parts With Accuracy

U.S. Patent #4,850,809 Two Patents Pending

Top Quality . . . Plus!

The HVLP AirVerter® system does the job on the first pass – every time. Low-pressure spraying, as low as 10 psi from your compressor, never leaves a pebbled finish and has fine atomization of high-solids materials of 65 percent.

AirVerter® : The quality of conventional, plus more!

The Air Is Free

AirVerter® reduces compressor costs because it uses up to 70 percent surrounding (ambient air) clean air that is free of moisture, oil and scale. That means a $1\frac{1}{2}$-horsepower compressor can power all your needs!

Flexibility

The AirVerter® will spray most liquids, everything from enamels and laquers to water-based paints, including polyurethanes, urethanes, epoxies, metallics, acrylics, primers and oil-based materials. In fact, one AirVerter® will run three spray guns simultaneously with some coatings.

AirVerter® can be hung on a wall, attached directly to pressure pots or to a painter's belt. It weights less than 2 lbs.

Why Pay To Paint The Floor?

There is one inevitable result of conventional paint spraying systems – more than three quarters of your paint costs end up on the ground in the form of overspray or fumes. Overspray means wasted cost and lower profits!

The AirVerter® helps dramatically limit overspray. It puts 85 percent of your paint on target, whether you're painting an F-14 fighter jet or a piece of rental equipment.

When you cut down overspray, you cut your paint cost. Cost recovery for the AirVerter® system can be achieved in days!

So, why pay to paint the floor?

Transfer Efficiency Saves Painting Costs (Or . . . How Much Paint From The Can Gets On The Equipment)

Conventional	25%
Airless	40%
AirVerter®	**85%**

EZ Clean Up And Maintenance

Less overspray. Less masking. Less clean up. Higher profits.

The Environment

Making And Breaking Business In The 90s

The environment and causes of pollution are the hottest issues of the 90s. Federal, state and local legislators have already begun severely limiting the way you do business.

This onslaught of legislation will not only affect big industry, but also the small and mid-size businessman nationwide. For the first time, the Clean Air Act will strictly enforce environmental regulations.

The AirVerter, a High-Volume Low-Pressure spraying system, not only helps save on the cost of painting, it dramatically cuts VOC [Volatile Organic Compound] emissions, reduces overspray by more than 50 percent, decreases personal hazards to operators and personnel, and exceeds air management bureau standards for 65 percent transfer efficiency.

The AirVerter meets the new regulations of the federal Clean Air Act and many state and local governmental bodies.

For example, the Bay Area Air Quality Management District (BAAQMD) in Northern California. Here are recent **mandatory** changes:

- Beginning July 1, 1990, 65-percent transfer efficiency will be required for primer coatings equipment
- January 1991, 65-percent transfer efficiency will be required for topcoat application equipment
- January 1992, VOC limits will be enforced that reflect current technology
- January 1, 1995, final VOC limits must be the lowest attainable.

The BAAMQD estimates these regulations will affect more than 2,000 auto body and paint shops in the Berkeley, California, area alone! It identifies HVLP systems, such as the AirVerter, as "having acceptable transfer efficiencies."

The painting is on the wall. Don't get bogged down in governmental regulations. The AirVerter meets government standards now!

You Can Comply With These Regulations And Cut Your Cost Of Painting In Half.

AirVerter®

Smith Eastern Corporation
5020 Sunnyside Ave.
Beltsville, MD 20705
301/937-4548

HOW THE AIRVERTER WORKS

The AirVerter system relies principally on air volume, <u>not</u> air pressure, to atomize paint. Your compressor is not the prime source for our atomizing air.

AirVerter uses your compressor for two purposes:

1. Provide the suction force for the AirVerter pump that pulls in the surrounding air.

2. Use what pressure and volume is left over to help atomize the paint.

About 70% of the atomizing air is surrounding air. The filtered ambient or surrounding air is free (without cost), clear of water, oil or pipe scale. This is the basis for our patent and the difference from all other spraying devices.

Smith Eastern Corporation
5020 Sunnyside Avenue
Suite 207
Beltsville, MD 20705
(301) 937-4548

AIRVERTER® PERFORMANCE TABLE

AIRFLOW CHART

Compressor Inbound Pressure PSIG	Compressor Inbound CFM Consumption	Atomizing Outbound CFM Energy	Atomizing Gun Head Pressure 5/8"	Atomizing Gun Head Pressure 1/2"
5	4.5	6.0	1.2	1.0
10	5.0	7.5	1.8	1.5
15	5.5	9.5	2.2	2.0
20	6.0	11.0	3.0	2.5
25	6.5	12.0	3.5	3.0
30	7.0	13.0	4.2	3.5
35	7.0	14.0	5.0	4.0
40	7.5	14.5	5.5	4.5
45	7.75	15.2	6.5	5.0
50	8.0	16.0	7.0	5.5
55	8.0	16.7	8.0	6.0
60	8.25	17.0	8.5	7.0

The AirVerter^R Advantage

EASY TO USE: No more complicated than a standard conventional gun.

EFFICIENT: Our patented design utilizes 75% - 80% ambient air for atomization - This insures clean air while saving wear and tear on compressors and assures maximum allowable air flow for low pressure spraying. We also have the ability to automatically shut down the compressor when the operator stops spraying. ***AirVerter^R spraying systems use up no more air than conventional spray guns, in many cases less.***

DURABLE: Few moving parts insure years of reliable service.

VERSATILE: Our compact design allows the AirVerter^R to go anywhere - It weighs less than 2 pounds and stands 6 inches high and 4 inches wide. Wall-mount, pot mount or portable.

VALUE: The AirVerter^R offers all the advantages of low pressure spraying while setting new standards for production, power and control all at a price that will please the most demanding customer.

UNIVERSAL: The AirVerter^R will accommodate any manufacture HVLP gun that utilizes a turbine or air conversion unit.

SAFE: AirVerter^R equipment complies with all current California Air Quality Management rules for transfer efficiency. Better Than 65%.

AMC
Tooele AD

The following literature is in reference to:

Project #	**Project Title**
29	Paint Sludge/Walnut Dust Incineration

#29

DRAFT REPORT

PILOT STUDY OF PAINT WASTE TREATMENT TECHNOLOGY
PHASE II REPORT
RECOMMENDATIONS FOR TECHNOLOGY DEVELOPMENT

by

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Contract No. DAAA15-88-D-0001 COE, Baltimore now
Task Order No. 0001 per APG
PN 3769-1 Roger Dillon 301 278614 412

Contracting Officer's Representative

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U. S. ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010-5401 AV584-3618 301 671 3615 2466

298110

March, 1990

TABLE 6-2. Summary of Paint Waste Generation and Characteristics.

Waste type	No. of drums	Wt./drum (lbs)	Total wt (lbs)	Btu/lb	% ash	Total Btu/yr	Total ash/yr (lbs)
Letterkenny Army Depot							
Abrasive blast residue							
Walnut shells	1,306	400	522,400	5,580	7	2.91E+09	36,568
Steel shot	226	800	180,800	1,000	90	1.81E+08	162,720
Plastic beads	82	400	32,800	6,830	9	2.24E+08	2,952
Glass	26	500	13,000	1,000	50	1.30E+07	6,500
Sand	5	500	2,500	1,000	90	2.50E+06	2,250
Chemical strip tank waste							
Methylene chloride							
liquid	49	500	24,500	3,000	4	7.35E+07	980
sludge	19	500	9,500	3,000	10	2.85E+07	950
Sodium hydroxide							
liquid	81	500	40,500	3,000	4	1.22E+08	1,620
sludge	9	500	4,500	3,000	10	1.35E+07	450
Paint application wastes							
Nanna peel	42	400	16,800	6,115	50	1.03E+08	8,400
Paint booth filters	298	300	89,400	5,800	50	5.19E+08	44,700
Paint arresters	68	300	20,400	6,000	50	1.22E+08	10,200
Thinner/paint sludge	98	500	49,000	7,500	18	3.68E+08	8,820
Water/primer	76	500	38,000	5,000	13	1.90E+08	4,940
Paint/solvent	3	500	1,500	7,500	15	1.13E+07	225
Epoxy/primer	55	500	27,500	7,500	15	2.06E+08	4,125
Paint chips	5	500	2,500	6,000	15	1.50E+07	375
Paint solvent residue	36	500	18,000	7,500	15	1.35E+08	2,700
Paint residue	36	500	18,000	6,000	15	1.08E+08	2,700
Paint solvent	12	500	6,000	7,500	15	4.50E+07	900
Miscellaneous paint waste							
Sanding booth filters	56	400	22,400	6,000	50	1.34E+08	11,200
Sanding paper and dirt	10	400	4,000	5,000	50	2.00E+07	2,000
Paper/tape/alum. foil	3	400	1,200	6,000	50	7.20E+06	600
Trash with CARC paint	108	500	54,000	4,000	50	2.16E+08	27,000
Paint, air hoses	1	500	500	4,000	50	2.00E+06	250
Paint sludge/dirt/oil	6	500	3,000	5,000	25	1.50E+07	750
Paint cans in speedy dry	4	500	2,000	4,000	80	8.00E+06	1,600
Paint residue water/th	17	500	8,500	6,000	15	5.10E+07	1,275
Total for Letterkenny Depot	2,737		1,213,200			5.85E+09	347,750
Anniston Army Depot							
Abrasive blast residue							
Glass			159,675	1,000	50	1.60E+08	79,838
Walnut shells			479,022	5,580	7	2.67E+09	33,532
Green Lightning			798,371	1,000	90	7.98E+08	718,534
Steel			79,837	1,000	90	7.98E+07	71,853
Aluminum oxide			79,837	1,000	90	7.98E+07	71,853
Black Beauty			1,653,750	1,000	90	1.65E+09	1,488,375
Chemical Stripping Sludge							
Methylene chloride			161,033	6,000	10	9.66E+08	16,103
Sodium hydroxide			152,550	6,000	10	9.15E+08	15,255
Paint Application Waste							
Water wall sludge			538,020	7,500	15	4.04E+09	80,703
Thinner/paint sludge			22,100	7,500	15	1.66E+08	3,315
Total for Anniston Depot			4,124,195			1.15E+10	2,579,361
Total for Both Depots			5,337,395			1.74E+10	2,927,111
Excluding Non-Incinerable Shot Blast Residues			2,542,300			1.46E+10	411,525

AED REPORT 10-90

AMMUNITION EQUIPMENT DIRECTORATE

TOOELE ARMY DEPOT, UTAH 84074-5004

WEIGHT REDUCTION OF WALNUT GRIT & PAINT CHIP MIXTURE BY INCINERATION

JAY L. BISHOP

16 JULY 1991

AMMUNITION EQUIPMENT DIRECTORATE
TOOELE ARMY DEPOT

TOOELE, UTAH 84074

AED REPORT 10-90

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TOOELE ARMY DEPOT, UTAH 84074-5004

WEIGHT REDUCTION OF WALNUT GRIT & PAINT CHIP MIXTURE BY INCINERATION

16 JUL 1991

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WEIGHT REDUCTION OF WALNUT GRIT & PAINT CHIP MIXTURE BY INCINERATION

Ammunition Equipment Directorate, Tooele Army Depot, Utah
Jay L. Bishop
16 Jul 1991

EXECUTIVE SUMMARY

Incineration of walnut grit and paint chip mixtures (WGPC) was considered as a way to lower disposal costs by the resulting weight reduction, and to provide degradation of the organic toxins present. Total degradation of organic toxins, and four different types of cost savings were confirmed, amounting to at least $0.07/lb, or >$70,000/year at Tooele Army Depot (TEAD).

The maximum weight reduction possible by incineration is 93%. But the weight reduction attainable within practical incineration time is about 60%, with no hazardous organics such as the carcinogenic isocyanates remaining in the residue. The WGPC is usually TCLP-toxic because of lead in the paint removed by the blast grit. Occasional batches of WGPC produced from the TEAD paint lines contain less than the toxic level of lead, and would be taken into the toxic range by the concentration effect of weight reduction during incineration. One such sample tested was under the hazardous level for lead, chromium and cadmium, thus qualifying for landfill disposal. But after the weight reduction by incineration the leachable lead was over the hazardous level. Now that the QA Lab at TEAD can run TCLP the cost of assay is low. If future facilities allow separate storage and chemical assay of every batch then the convenience of landfill disposal for qualifying batches will save cost, besides the lower cost from weight reduction of hazardous batches.

In these tests the optimum feed rate in the APE-1236 deactivation furnace was 300 lbs/hr, with 20 minutes residence time for solids at the slowest kiln rotation setting. Under these conditions weight reductions of 54% and 59% resulted from two runs in the APE-1236 furnace, as opposed to 39% for a 1-hour run in the car-bottom furnace which did not completely destroy toxic organics.

When this project began, the contracted WGPC disposal cost was $4/lb. In the current contract it is $0.28/lb. Cost of the incineration step is estimated at $0.11/lb. This plus the reduced equivalent disposal cost of $0.10/lb gives $0.21/lb, a $0.07/lb saving from the current contract cost of $0.28/lb. Efficiency improvement of incineration is possible, for greater savings.

Thus savings of at least $0.07/lb is expected by incineration of the WGPC before disposal, with the absence of carcinogenic polycyclic aromatic hydrocarbons and complete detoxification of organics such as solvents and the carcinogenic isocyanates.

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INTRODUCTION

Project Goals.

Incineration of WGPC is tested to determine whether diaposal cost savings from weight reduction exceed the cost of incineration, and to determine whether the incineration eliminates any toxic components. Other savings may also be discovered.

Background.

Disposal cost for hazardous waste has escalated to millions of dollars yearly at most installations. One potential means for lowering this cost is to reduce the weight of the hazardous waste. Walnut shell grit is used to blast off old paint from equipment scheduled for new paint. The resulting dry mixture of WGPC is usually a hazardous waste under the Resource Conservation and Recovery Act (RCRA) by virtue of the toxic lead and sometimes also chromium and cadmium content imparted to it by various paint types. When this project was first considered (T-32-88) disposal costs had reached $4/lb. The disposal cost is now $0.28/lb, which amounts to about $280,000 annually at TEAD.

The possibility was considered to burn the combustible portion of WGPC to reduce the weight and so also the disposal cost. WGPC has two components which are combustible: wood and paint. Walnut shell is a type of hardwood which leaves only a small amount of ash upon complete combustion, accounting for about 7% of the original weight.[1] Most paint types contain varying amounts of organic polymers and other chemicals, along with inorganics which combust to metal oxides or salts. Much of the paint in WGPC at TEAD is a chemical agent resistant coating (CARC paint), a polymer formed from carcinogenic isocyanate monomers. A small amount of the monomer is present in the polymerized paint. Incomplete combustion of the polymer gives toxic cyanides and carcinogenic isocyanates, but complete combustion converts these to water, carbon dioxide and nitrogen gas. A small amount of chlorine present goes to salts and hydrogen chloride gas.

The 93% theoretical maximum weight reduction of walnut grit was determined in a USATHAMA pilot study of paint waste treatment technology.[1] The residue can actually weigh more than 7% of the starting weight because of uncombustible metal compounds in the blasted paint.

But complete combustion of WGPC is not likely to be attained in a practical incineration time. An intermediate slow burning carbonaceous char is expected from lignin and paint components, which will require many hours for total combustion. However, the char represents attainment of a steady state, which may indeed be void of all the isocyanates, benzo(a)pyrenes and other organic toxins. If the incineration is managed to give such a residue within a practical incineration time, the weight reduction may give a cost advantage without total combustion.

Facilities.

Practical incineration tests are run in the APE-1236 furnace at the AED Test Furnace Site and the APE-2048 car-bottom furnace at the same site. The resulting weight reduction values are compared with weight reduction in contracted ash analysis of small samples.

Risk to Test Personnel.

The only significant hazard to those who handle dry mixtures of walnut grit and paint is inhalation of air containing the suspended dust. If air flow cannot be controlled to carry walnut/paint dust away from the worker, respirator use with SAF filters is recommended.

TEST PROCEDURE AND RESULTS

Practical mode tests were run in the APE-1236 rotary kiln. The kiln rotation was set for the slowest rate to give a 20-minute residence time for the solids. It was heated at 1300 °F as scrap iron was fed through for two hours to scrape it clean. Then 175 lbs of the waste walnut/paint mixture was introduced in 2-lb increments in paper bags at 10 lbs/min, followed by 20 minutes of scraping out with scrap iron. The residue was weighed, bagged, and labeled with the furnace conditions. A second run in the rotary kiln at 1500 °F followed the same style otherwise.

Weight reduction during incineration without tumbling, but with a longer residence time was measured in the APE-2048 car-bottom furnace at the AED furnace test site. A stainless steel pan was heated, cooled and weighed. Typical paint line waste mixture of walnut grit and paint residue was put into the pan at a 1-inch depth. The pan was weighed, burned for 60 minutes at 1400 °F, cooled and reweighed.

Only 39.2% weight reduction resulted in the car-bottom furnace in 60 minutes, whereas 53.6% and 58.8% weight reduction resulted in the rotary kiln in 20 minute runs at 1300 °F and 1500 °F respectively. Thus tumbling action to expose more surface area to the oxidizing vapor phase was more effective than longer incineration time. A small part of the weight loss was due to moisture content, which ranged from 1.05 to 2.70%.

Small samples of untreated WGPC were submitted to a contract laboratory for 16- and 35-hour "ignition" tests for percent ash residue (combustion in a high-temperature assay kiln). These did not attain the theoretical maximum weight loss because of the slow oxidation rate of the intermediate char, but attained weight losses of from 28% to 75% in 16 hours. Only 1 percent additional weight loss resulted from 35 hours of ignition, compared to 16 hours. Samples of the residues from the AED furnace tests were also ignited for 16 hours, but gave only slightly improved weight loss averaging 3 percent.

SCOPE OF THE PROJECT

High accuracy in determination of % weight loss is not possible in the few runs allowed by the narrow scope of this project. Also a range for % weight loss from ignition of small samples will result from the fact that the granular WGPC is not uniform. The paint content varies in type and amount throughout the bulk grit. Thus ignition of small samples can be expected to give differing amounts of charred residue, with differing amounts of metal, differing grain structure and so differing rates of oxidation in the slow process toward complete combustion. The main question is whether the long time required for complete combustion of the charred residue can be ignored, and whether sufficient cost savings along with destruction of the toxic organics can be attained in the first part of the incineration. This goal was achieved, and feasibility of cost reduction by incineration within a practical time was confirmed in the rotary kiln, to give a disposable product with no toxic organics.

HAZARDOUS WASTE CLASSIFICATION OF FEEDSTOCK AND FURNACE RESIDUE

Assays of WGPC usually show lead (Pb HW# D008) near or above the TCLP hazardous level, and sometimes also cadmium (Cd HW# D006) chromium (Cr HW# D007) and barium (Ba HW# D005). These metals come from the paints. Organic analyses show the presence of carcinogenic isocyanate monomers and polymers, and sometimes solvents originating with the paint. There is only a trace of sulfur. There is usually no mercury (Hg) and then only a trace. New walnut shell blasting grit has a heat value (heat of combustion) of 5580 BTU/lb; heat value varies within 20% of this for the WGPC mixture. Chlorine is present at only a few parts per million. Slight varying amounts of paint solvents of the EPA classes for HW# F1 to F5 are sometimes present in WGPC.

Walnut grit is a type of hard wood, and as such is mostly combustible. The ash residue equal to 7% of the original weight is composed of potash and related inorganic oxides and salts common in ash from woods in general. Barium, cadmium, chromium and lead from the paint, plus their salts or oxides can thus be present in the ash in leachable forms (HW classes D005, D006, D007 or D008). But it turns out the barium leaches only slightly. Furnace residue contains no isocyanates, F solvents or other organics, which are destroyed by the incineration.

WGPC composition summary:

Heat value	5580-7000 BTU/lb	Chromium	trace to 2000 ppm
Organics	up to 10%	TCLP chromium	tr to 25 mg/L
Sulfur	trace	Lead	trace to about 2%
Chlorine	trace to 1%	TCLP lead	2 to 20 mg/L
Barium	trace to 700 ppm	Mercury	trace
TCLP barium	trace to 1 mg/L	TCLP mercury	nil
Cadmium	trace to 200 ppm	Selenium	nil
TCLP cadmium	trace to 5 mg/L	Silver	nil

FOUR MEANS OF COST REDUCTION IN THE DISPOSAL OF WGPC

Incineration of WGPC destroys the isocyanates and solvents present. Weight reduction by incineration increases the lead concentration and also gives higher leachable lead in TCLP assay. Cadmium and chromium have enough volatility that significant lowering of the Cd and Cr TCLP levels is possible. But this means that the vaporized metal goes into the flue and will recondense in the cooler parts of the control system, like the baghouse. The amount of Cd and Cr in the final exhaust gas emitted into the air following all pollution control systems will be regulated according to the permit of any system which uses this method. Reports on this subject are available from other projects, such as the upgrade project to qualify military APE-1236 furnaces at many locations to meet current EPA requirements under RCRA.[2,3]

WGPC batches that have leachable lead lower than the toxic level for Pb TCLP may qualify for ordinary landfill as (non-hazardous) solid waste. To take advantage of this additional cost saving would require chemical analysis of every batch. TCLP assays have become quite expensive, usually ranging from $150 to $900 depending on whether TCLP (leachable) organics must be determined in addition to the TCLP metals. TCLP assay cost for the 8 toxic metals varies up to $300 among the geographical locations in USA.

Tooele Army Depot (TEAD) has recently qualified its QA lab to run TCLP for the 8 toxic metals (but not for the TCLP organics). This provides a saving of both cost and time. The TEAD lab can also run total metals at an even lower cost. Therefore it is feasible at least at the TEAD location to screen a sample by determination of the total amount (not leachable amount) of TCLP metal present. If the amount present is less than the leachable level declared toxic by RCRA, then the TCLP assay need not be run, because the sample could not give toxic levels if the entire metal content were to leach out. Thus we have 4 levels of cost savings: prescreen samples by the fast and inexpensive total metals assay at the TEAD QA lab, run necessary TCLP assays at the TEAD QA lab instead of at contracting labs, analyze every batch of WGPC so that qualifying batches can go to landfill rather than the more costly hazardous waste disposal, and incinerate the non-qualifying batches to give a lower cost hazardous waste disposal.

CHEMICAL ANALYSES

FURNACE RESIDUES COMPARED WITH FEEDSTOCK

	Feedstock	* Fly Ash Residue	Rotary Residue Burn-1	Rotary Residue Burn-2	Car-Bot Residue Burn-3
Isocyanate ppm	13.50	<0.10**	<0.10		3.00
Methyl ethyl ketone ppm	0.033	<0.001			
Organic chlorine ppm	1.04	<0.01			
Benzo(a)pyrene ppm		<0.03	<0.07		<0.07
TCLP Arsenic mg/L	<0.01	0.02	<0.01	<0.01	<0.01
TCLP Barium mg/L	0.63	0.27	1.39	1.49	2.44
TCLP Cadmium mg/L	0.47	2.09	0.07	0.13	<0.01
TCLP Chromium mg/L	4.12	0.05	0.36	0.13	0.25
TCLP Lead mg/L	4.70	6.94	101.00	56.20	70.00
TCLP Mercury mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
TCLP Selenium mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
TCLP Silver mg/L	<0.01	<0.01	<0.01	<0.01	<0.01

*Slight residues from the gas cooler and baghouse were combined with the cyclone residue as one total collection of fly ash.
**In all charts of analytical data, numbers following < indicate detection limit, and also that none was detected at the detection limit.

Underlined entries are over the TCLP limit for toxicity.

EP- AND TCLP- TOXICITY AND TOTAL METALS ANALYSIS OF WGPC BATCHES

	Apr 1990 WGPC Bulk EP/Total	June 1990 WGPC Bulk TCLP/Total	July 1990 WGPC Bulk TCLP/Total	HW Level TCLP
Leachable Arsenic mg/L	<0.01	<0.01	<0.20	5
Total Arsenic ppm	2.80		24.1	
Leachable Barium mg/L	0.13	0.63	0.56	100
Total Barium ppm	380		675	
Leachable Cadmium mg/L	2.00	0.47	4.90	1
Total Cadmium ppm	102		123	
Leachable Chromium mg/L	3.80	4.12	23.00	5
Total Chromium ppm	1758		2927	
Leachable Lead mg/L	0.42	4.70	2.89	5
Total Lead ppm	6670		16775	
Leachable Mercury mg/L	<0.001	<0.001	<0.001	0.2
Total Mercury ppm	0.27		0.27	
Leachable Selenium mg/L	<0.01	<0.01	<0.20	1
Total Selenium ppm	<0.13		<8.92	
Leachable Silver mg/L	<0.01	<0.01	<0.01	5
Total Silver ppm	<0.13		<0.45	
Total Nickel ppm	23.52		34.80	
Total Thallium ppm	<0.65		<2.23	
pH	6.50	6.50	8.30	
Reactive H2S mg/kg	<0.10		<30.0	
Reactive HCN mg/kg	<0.01		<15.0	
Ignitability EPA 1010	>200		200	

CONCLUSIONS AND RECOMMENDATIONS

Incineration of walnut grit and paint chip mixture (WGPC) can give total degradation of organic toxins, and savings of least \$0.07/lb, or >\$70,000/year at Tooele Army Depot (TEAD). More savings are possible if the following steps are introduced: Prescreen every WGPC batch by the fast and inexpensive total metals assay at the TEAD QA lab; then run TCLP assays only on batches showing total metals over TCLP limits, and run them at the TEAD QA lab instead of contracting labs; dispose qualifying batches in the landfill rather than by more costly hazardous waste disposal; and incinerate the non-qualifying batches, usually TCLP-toxic from lead in the paint, to give a lower cost hazardous waste disposal. Efficiency improvement of incineration is possible, for even greater savings. Maximum weight reduction possible by incineration is 93%. But weight reduction attainable within practical incineration time is about 60%.

ABBREVIATIONS

AED	Ammunition Equipment Directorate
APE	Ammunition Peculiar Equipment
CARC	Chemical agent resistant coating
$/lb	Dollars per pound
EP	Extraction Procedure, now replaced by TCLP
EPA	US Environmental Protection Agency
lbs/hr	Pounds per hour
mg/L	Milligrams per liter
ppm	Parts per million
RCRA	Resource Conservation and Recovery Act
TCLP	Toxic Characteristic Leaching Procedure
TEAD	Tooele Army Depot, Utah 84074
WGPC	Walnut grit and paint chip mixture

REFERENCES

1. Pilot Study of Paint Waste Treatment Technology, Phase II Report, Recommendations for Technology Development, PEI Associates, Inc. 11499 Chester Road, Cincinnati, OH 45246, Contract No. DAAA15-88-D-0001 PN 3769-1, US Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, MD 21010-5401, March 1990, Table 6-2.

2. "Air Pollution Assessment No. 42-21-0475-91, Trial Burn for Deactivation Furnace, Bldg 97, Lake City Army Ammunition Plant, Independence, MO, 19 Feb to 6 Mar 1991," US Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD 21010-5422.

3. Hazardous Waste Incineration Guidance Series: Vol IV, Guidance on Metals and Hydrogen Chloride Controls, March 1989, Environmental Protection Agency, Office of Solid Waste, Waste Treatment Branch, 401 M Street, SW Wash, D.C. 20460.

#29

PAINT SLUDGE WEIGHT REDUCTION

STATUS REPORT

28 FEBRUARY 1989

AED

AMMUNITION EQUIPMENT DIRECTORATE

TOOELE ARMY DEPOT

TOOELE, UTAH 84074

STATUS REPORT

PAINT SLUDGE WEIGHT REDUCTION

28 February 1989

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SUMMARY

Tooele Army Depot produces approximately 28,000 gallons of paint sludge each year. This waste is generated from the activities of maintenance and refurbishing of military vehicles and equipment. Disposal of this waste through contractors costs the depot over one million dollars per year. Depot Systems Command has tasked and funded the Ammunition Equipment Directorate (AED) to conduct a feasibility study for minimizing the amount of paint sludge to be disposed of through contractors, thus reducing disposal costs.

A simplified feasibility study was conducted in 1988 to determine if paint sludge could be reduced in volume and weight by incineration in the APE 1236 deactivation furnace at the AED test facility. The following results demonstrated that substantial weight reduction could be achieved:

a. The standard APE 1236 furnace reduced the paint sludge weight by about 90 percent. The residual dry ash, which contains heavy metals, can be disposed of in a hazardous waste landfill.

b. A feed rate of 11 pounds per minute was used, equivalent to approximately one drum per hour. It is estimated that at this rate the furnace could process all of the paint sludges generated at TEAD by operating one day per week.

c. In a preliminary economic analysis, excluding capitalization, maintenance, and administrative costs, it was estimated that annual savings of about one million dollars could be achieved.

A pilot scale process has been designed and partially fabricated. In this study the throughput rates and percent weight reduction will be determined. The pilot process is expected to increase the throughput and decrease the labor required to process paint sludge. Funding for the pilot study is being pursued.

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BACKGROUND

Tooele Army Depot (TEAD) produces approximately 28,000 gallons of paint sludges of various constituents each year (see Appendix). These wastes are being generated from depot activities such as maintenance, modification, and refurbishing of military vehicles and equipment. Disposal of these wastes through commercial contractors costs the depot over one million dollars per year (see Appendix).

Depot System Command (DESCOM) through the Environment Management Office at TEAD, has tasked and funded the Ammunition Equipment Directorate (AED) to conduct a feasibility study for minimizing the amount of paint sludges that are to be disposed of through contractors, thus reducing the costs of disposal.

This status report discusses the results of the feasibility study, the test procedures employed, the process equipment used, and the test results. Also, discussed briefly is the plan for a pilot study, equipment to be used, operational procedures, and the anticipated results. Finally, a preliminary economic analysis and a recommendation for further action are presented.

PAINT SLUDGE

1. Enamel paints are used in small amounts and are not considered in this study. The paint sludges considered are polyurethane paints and contain mixtures of polyurethane, epoxy-polyamides, paint thinner, chromium, lead, organic and inorganic pigments, titanium oxide, zinc oxides, various organic solvents, additives, water, dirt, and other impurities.

2. Chemical and physical characteristics including the rheology, sedimentation, and hardening of paint sludge mixtures require specially designed pumps, a macerator, and feed injector for processing in an incinerator.

A simplified feasibility study was conducted to determine if the paint sludges can be reduced in volume and weight by incineration in a standard military furnace at AED's test facility.

a. Equipment Description

(1) Furnace - APE 1236 Deactivation Furnace was considered to be appropriate for incineration.

(2) Afterburner - An afterburner, which is an integral part of the APE 1236 Deactivation Furnace system, was used throughout the feasibility study to enhance combustion efficiency. It was operated at 1100 degrees F, which is lower than the normal operation temperature of 1800 degrees F.

(3) High Temperature Quencher - The high temperature quencher was used without injecting water. Freezing weather prevented the use of the water injectors.

(4) Low Temperature Gas Cooler - The low temperature gas cooler was operated as required for a normal incineration procedure.

(5) Draft Fan/Motor - The pulley on the motor was replaced with a larger one to increase the fan RPM. This increased the draft in the incineration system by about 30%.

The schematic layout of the incineration system at AED's test site, including pollution control systems, is shown in Figure 1.

b. Test Procedure

(1) Bagging Method

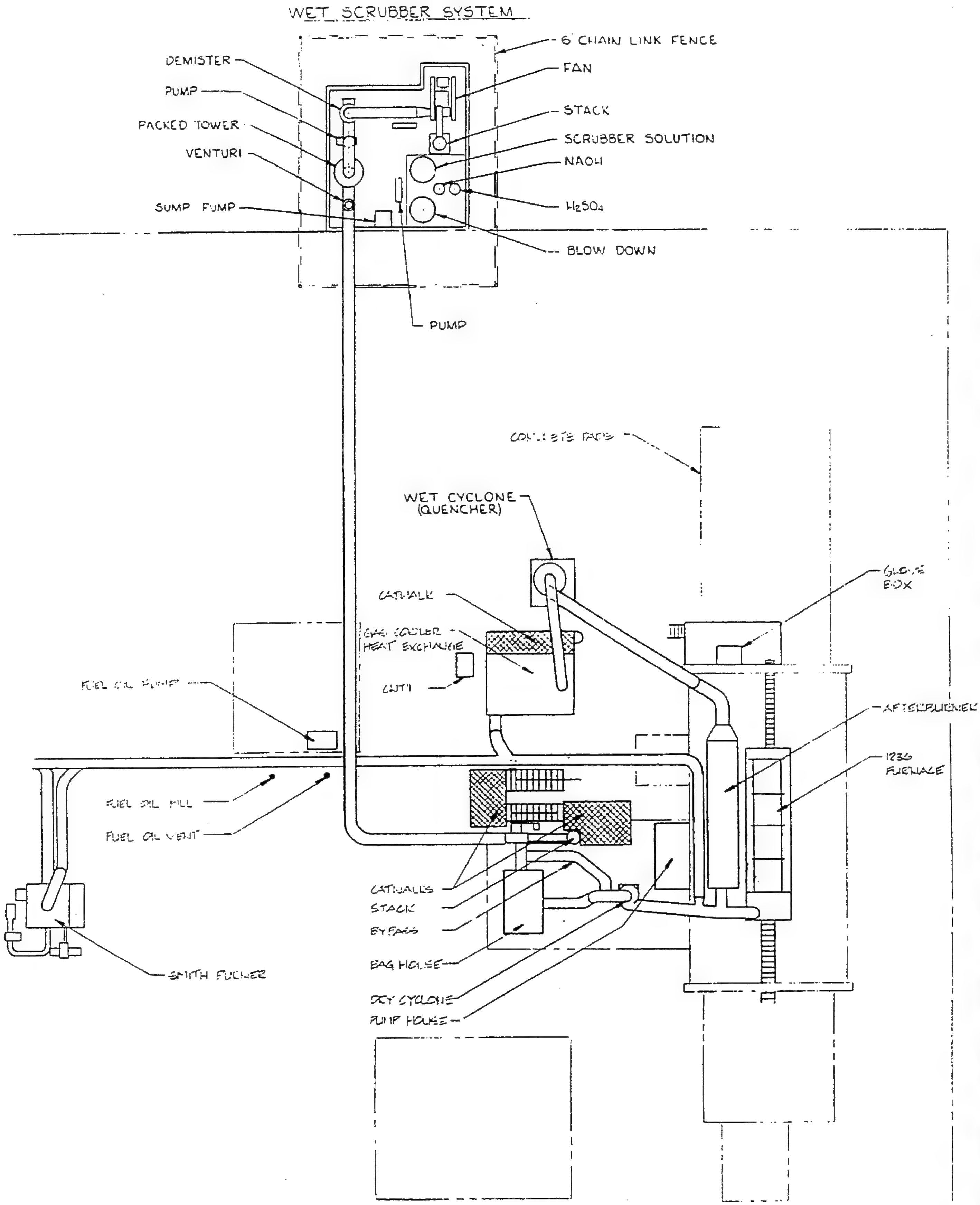


Figure 1
Incineration system at AED

(a) Sample Preparation - Two large ammo boxes containing about 100 lbs of paint sludge, were obtained from a drum stored at the paint shop for each incineration test. Figure 2 shows the storage drum containing polyurethane paint sludge. The sludges were stirred thoroughly, manually as shown in Figure 3, to produce a homogeneous mixture. Approximately three pounds of sludge were poured into a zip-lock plastic bag, using a stainless steel funnel (Figures 4 and 5). The plastic bag containing the paint sludge was then placed in a paper sack and reweighed. The paper sacks were needed to prevent premature melting of the plastic bags in the feed chute. Figure 6 shows the bagged samples ready for incineration.

(b) Furnace Conditions - The APE 1236 Deactivation Furnace was preheated to 1300 degrees F at the burner end, and 450 degrees F at the stack end. Thermal equilibrium was reached in one hour. To maximize the combustion time, the rotation rate of the furnace was set at 0.33 RPM which provided a combustion residence time of 28 minutes.

(c) Feeding and Feed Rate - The feed rate was controlled by placing an appropriate number of bags containing the paint sludge on the feed conveyor each minute. The maximum feed rate was determined by observing fugitive emissions, caused by over feeding, from the furnace and the draft fan housing.

(2) Canister Method

(a) Sample Preparation - Thirty steel canisters were fabricated from 4 inch mild steel tubing. The bottom end was sealed by welding on a circular steel disk. The top end was machined such that a paint can lid would fit flush. A photograph of a machined canister is shown in Figure 7. Figure 8 shows the canisters filled with paint sludge for incineration. The paint sludge was prepared as discussed in paragraph b.(1)(a).

Using a stainless steel funnel, the canisters were each filled with 2.7 pounds of paint sludge and sealed with paint can lids by lightly

Figure 2

Paint sludge storage drum (Paint Shop)

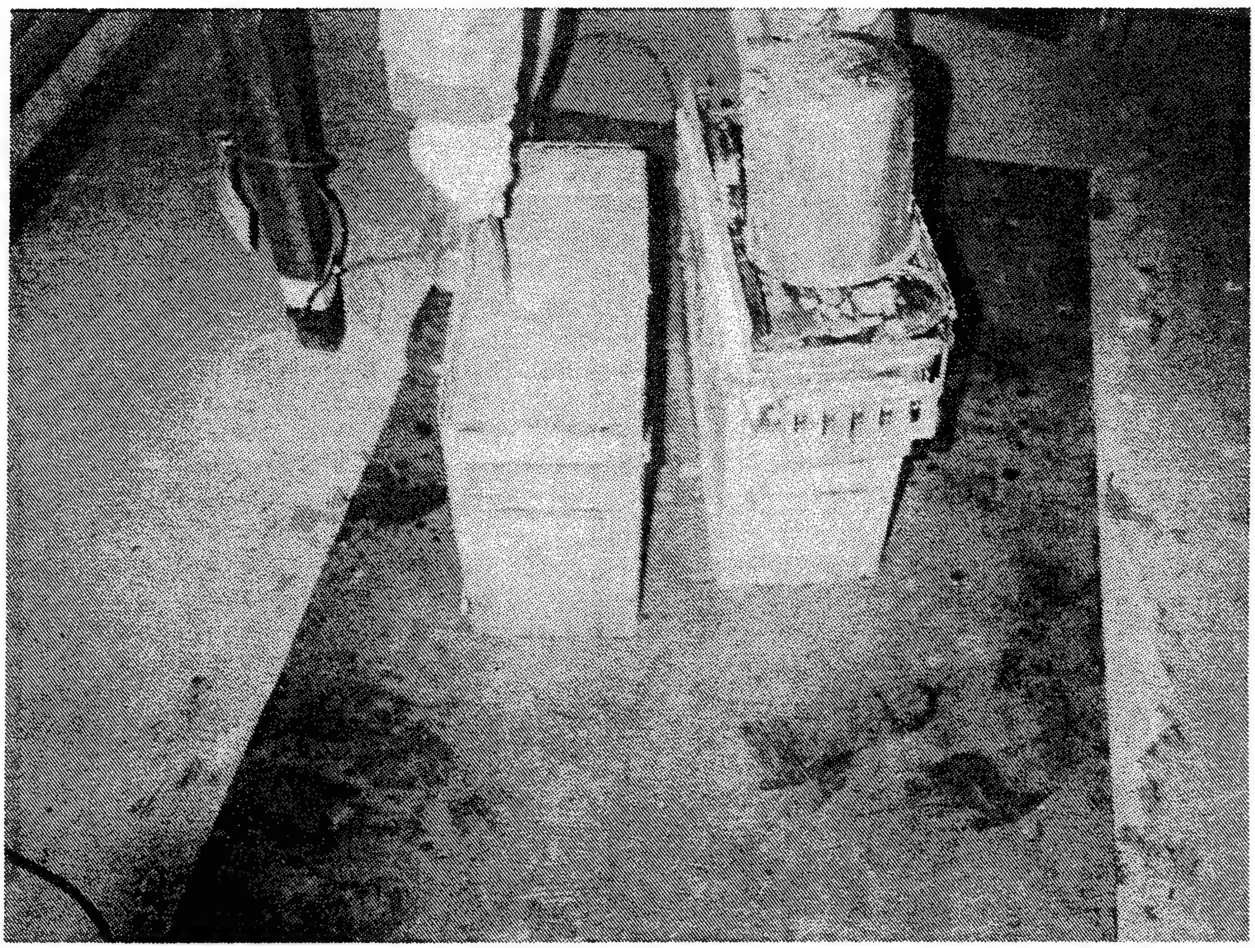


Figure 3

Preparation of paint sludge for bagging

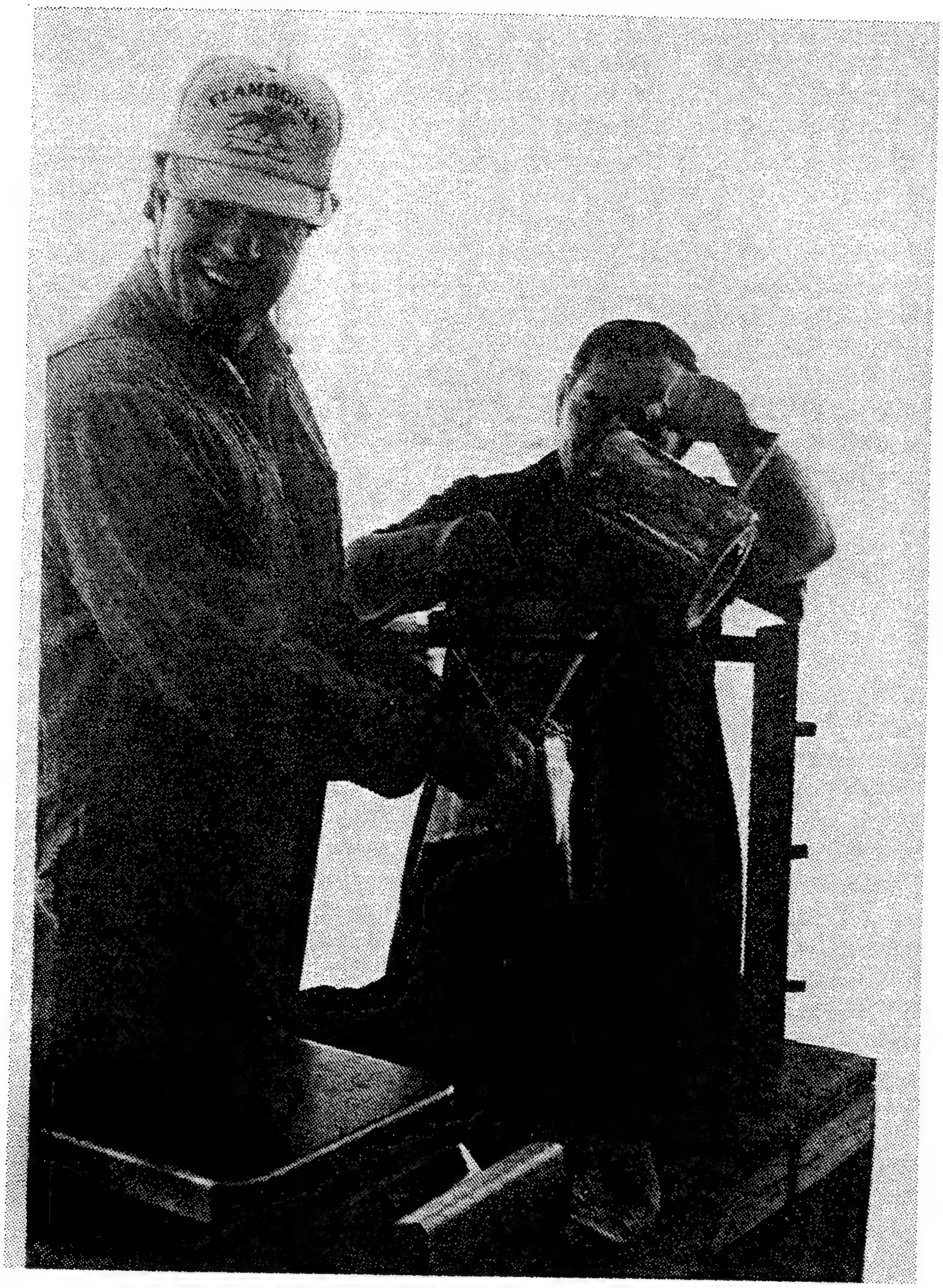


Figure 4

Bagging of paint sludge

Figure 5

Paint sludge in plastic bags

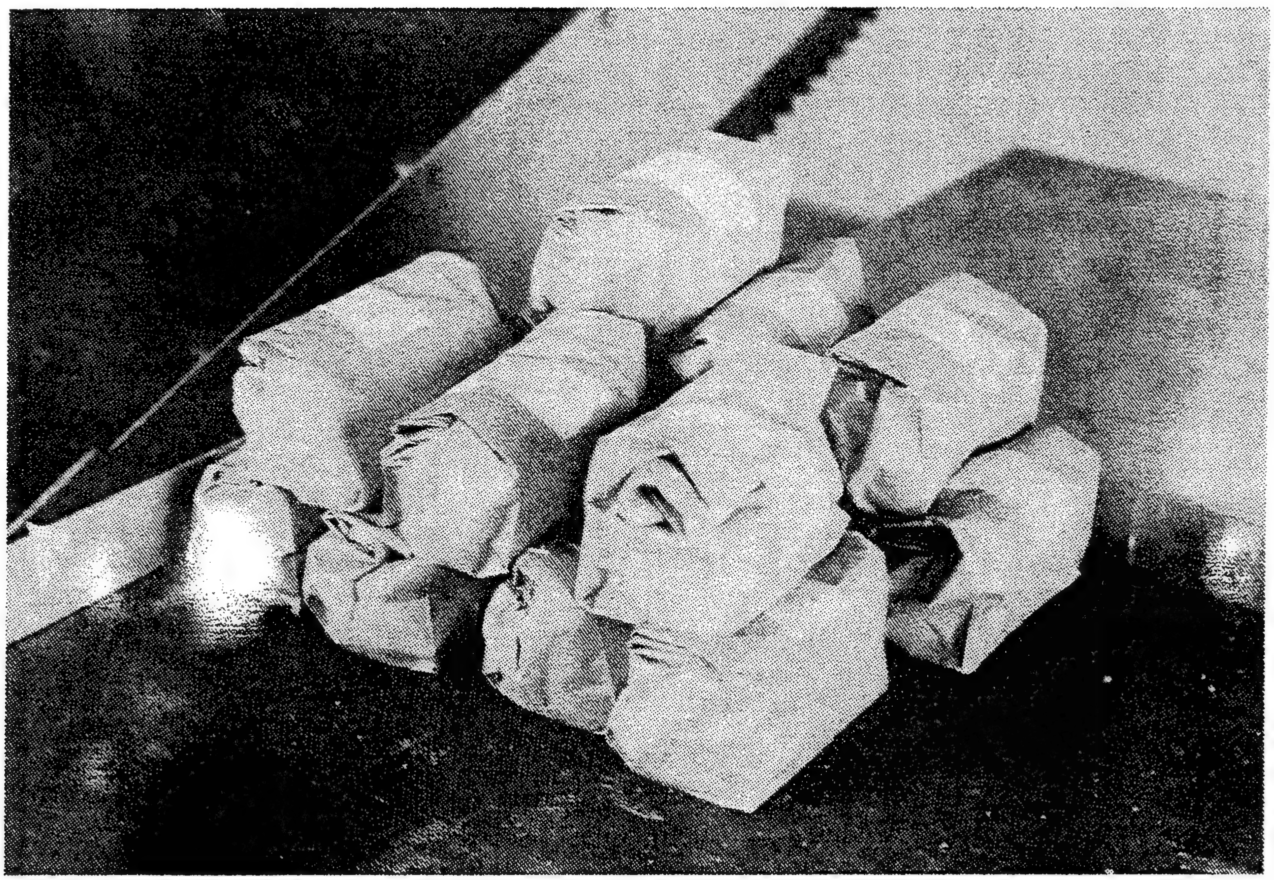


Figure 6

Bagged paint sludge ready for incineration test

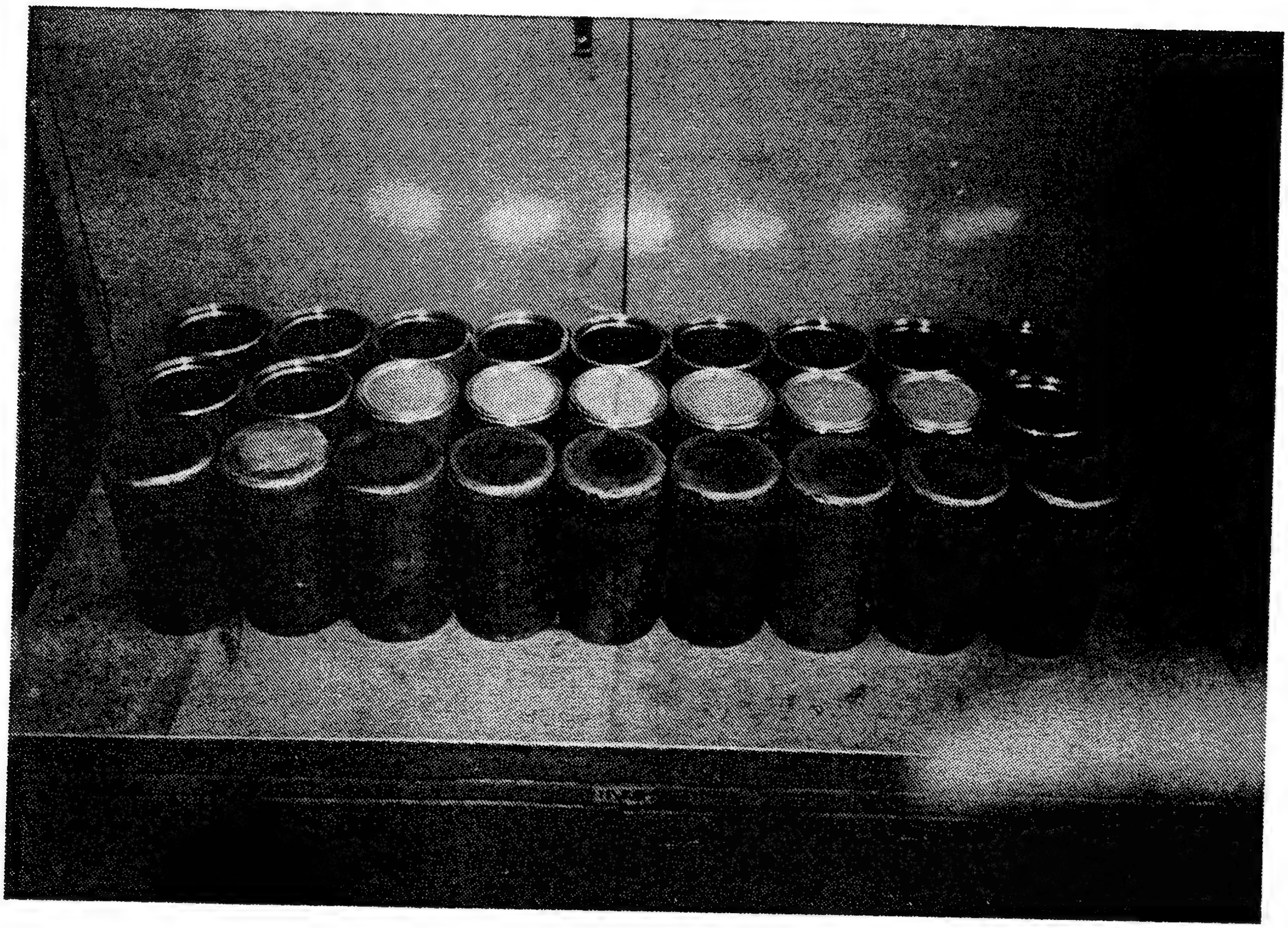


Figure 7

Canisters

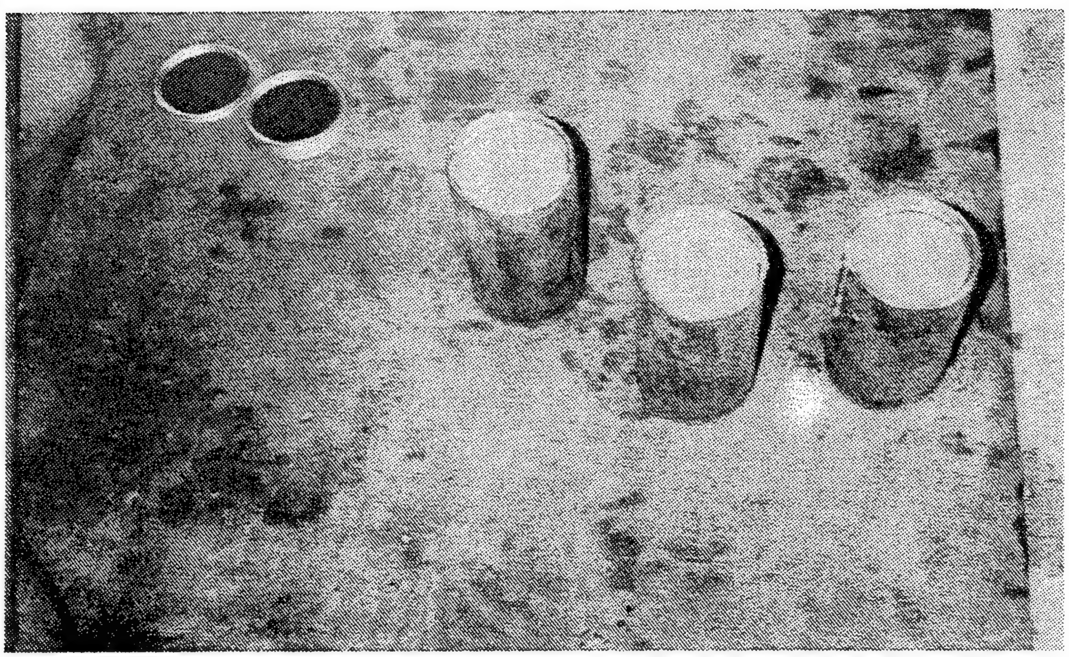


Figure 8

Canisters filled with paint sludge

tapping the lids into the canisters. When a canister containing paint sludge was fed into the furnace, high temperature caused expansion and the lid would pop open, spilling the paint sludge inside of the furnace where burning could take place.

When paper sacks and plastic bags are burned, additional smoke and pieces of charred paper are created. Rotary kilns and furnaces, such as the APE 1236, are not efficient at burning paper products. By replacing bags and sacks with metal canisters, problems were eliminated, more draft was made available, and the feed rate was increased to make use of the draft.

(b) Furnace Conditions - The same as described in the section b.(1)(b) above.

(c) Feeding and Feed Rate - The same as described in the section b.(1)(c) above.

RESULTS OF FEASIBILITY STUDY

1. Feed Rate

a. A maximum of 11 pounds per minute burning rate was achieved during the feasibility incineration tests.

b. The inefficient burning of the paper and plastic bags resulted in large volumes of smoke and burning debris which were seen as fugitive emissions escaping from the feed chute area of the furnace. The fugitive emissions limited the feed rate to three pounds per minute.

c. By replacing paper sacks and plastic bags with steel canisters, the paint sludge feed rate was increased to 11 pounds per minute with no fugitive emissions. It is anticipated that the final feed rate may exceed this value because the furnace did not reach its draft limited burning capacity, which would have been indicated by fugitive emissions during the

feasibility tests. The results of the feasibility study are given in Table 1.

2. Weight Reduction

a. The single most significant fact of this study to date is the weight reductions that have been demonstrated during these initial tests. The test results showed that the weight of paint sludge fed can be reduced by 83% to 96%. This large variation in reduction rates may have resulted from the fact that the sample sludges were taken from non-uniform, non-homogeneous storage drums on different days. Also, accumulation of ash in the retort, cyclone, or other parts of the duct system may account for some of the variations.

b. Furthermore, the results indicate that approximately 90% of the paint sludge consists of combustible organic compounds, such as plasticizers, hardeners, organic pigments and a mixture of organic solvents. An ecologically safe destruction of these compounds using a standard military furnace such as APE 1236 Deactivation Furnace is entirely possible. The ash or residue of the paint sludge is noncombustible inorganic matter, such as oxides of metals and inorganic pigments. The test results are given in Table 2.

3. Residue Ash

The noncombustible ash discharged from the furnace is light green in color and is made up of fine granule solids. It has no odor and is light in weight. This dry residue would be considered a landfillable hazardous waste due to its heavy metal content. Chemical analyses will be performed on the ash to determine the specific constituents and their concentrations. Some of the residue ash collected is shown in Figure 9.

PILOT STUDY

1. The feasibility study was conducted as a batch process to simplify the work involved. The study was conducted to prove that (1) a standard,

TABLE 1

PAINT SLUDGE INCINERATION

DATE SEPTEMBER	RUN NUMBER	MATERIAL PAINT SLUDGE	DRAFT RANGE INCHES		STACK TEMPERATURE RANGE F.		BURNER TEMPERATURE RANGE F.		BURNING RATE LBS./MIN
	2	WET	0.18	0.20	440	490	1250	1510	2/2
30	1	WET	0.20	0.24	435	475	1290	1460	1
	2	WET	0.20	0.24	440	490	1270	1500	1
OCT. 3		WET	0.17	0.22	440	490	1300	1520	3
11		WET	0.09	0.14	400	640	1200	1400	3
12		WET	0.10	0.17	360	640	1160	1400	3
17		WET	0.13	0.20	400	450	1160	1380	3
18		WET	0.15	0.20	400	540	1200	1400	6
19	1	WET	0.15	0.20	380	420	1200	1400	6
	2	WET	0.15	0.20	400	860	1100	1380	6
	3	RESIDUE	0.15	0.20	380	420	1150	1400	2
20	1	RESIDUE	0.15	0.20	380	420	1160	1400	2
JAN. 10		CAN/WET	0.25	0.30	380	420	1000		10.8

Table 1

Burning rate, paint sludge incineration

TABLE 2

PAINT SLUDGE INCINERATION

DATE SEPTEMBER	RUN NUMBER	MATERIAL PAINT SLUDGE	DRAFT RANGE INCHES		STACK TEMPERATURE RANGE F.		BURNER TEMPERATURE RANGE F.		INITIAL WEIGHT LBS.	RESIDUE WEIGHT LBS.	PERCENT REDUCTION %
	2	WET	0.18	0.20	440	490	1250	1510	29.30	1.00	96.59
30	1	WET	0.20	0.24	435	475	1290	1460	30.45	1.30	95.73
	2	WET	0.20	0.24	440	490	1270	1500	30.40	2.25	92.60
OCT. 3		WET	0.17	0.22	440	490	1300	1520	32.95	2.80	91.50
11		WET	0.09	0.14	400	640	1200	1400	59.55	9.10	84.72
12		WET	0.10	0.17	360	640	1160	1400	60.50	6.90	88.60
17		WET	0.13	0.20	400	450	1160	1380	62.00	8.10	86.94
18		WET	0.15	0.20	400	540	1200	1400	65.60	8.60	86.89
19	1	WET	0.15	0.20	380	420	1200	1400	62.10	10.00	83.90
	2	WET	0.15	0.20	400	860	1100	1380	59.95	6.20	89.66
	3	RESIDUE	0.15	0.20	380	420	1150	1400	24.35	18.50	24.02
20	1	RESIDUE	0.15	0.20	380	420	1160	1400	24.30	7.30	69.96
JAN. 10		CAN/WET	0.25	0.30	380	420	1000		78.30		

Table 2

Weight reduction, paint sludge incineration

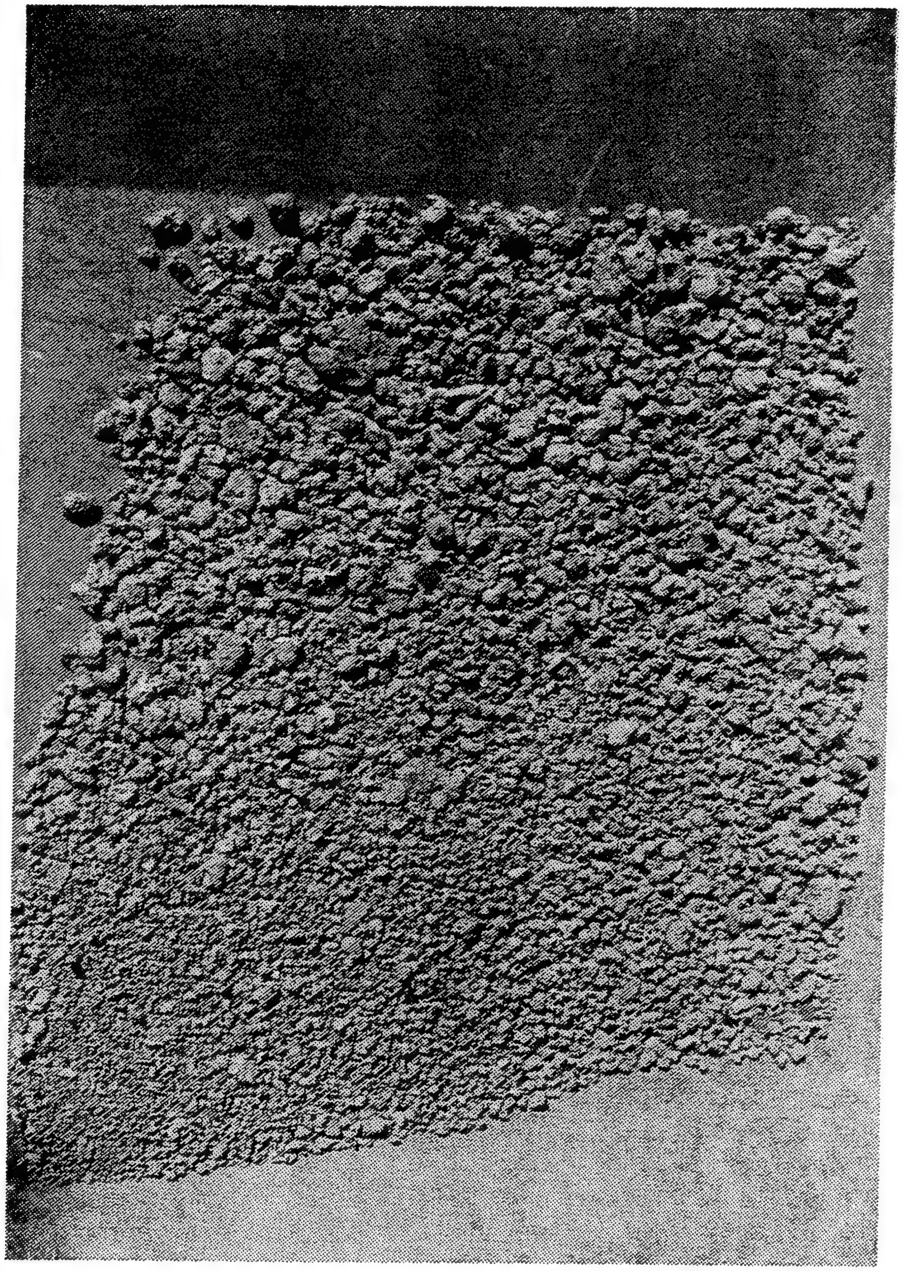


Figure 9

Residue ash, paint sludge incineration

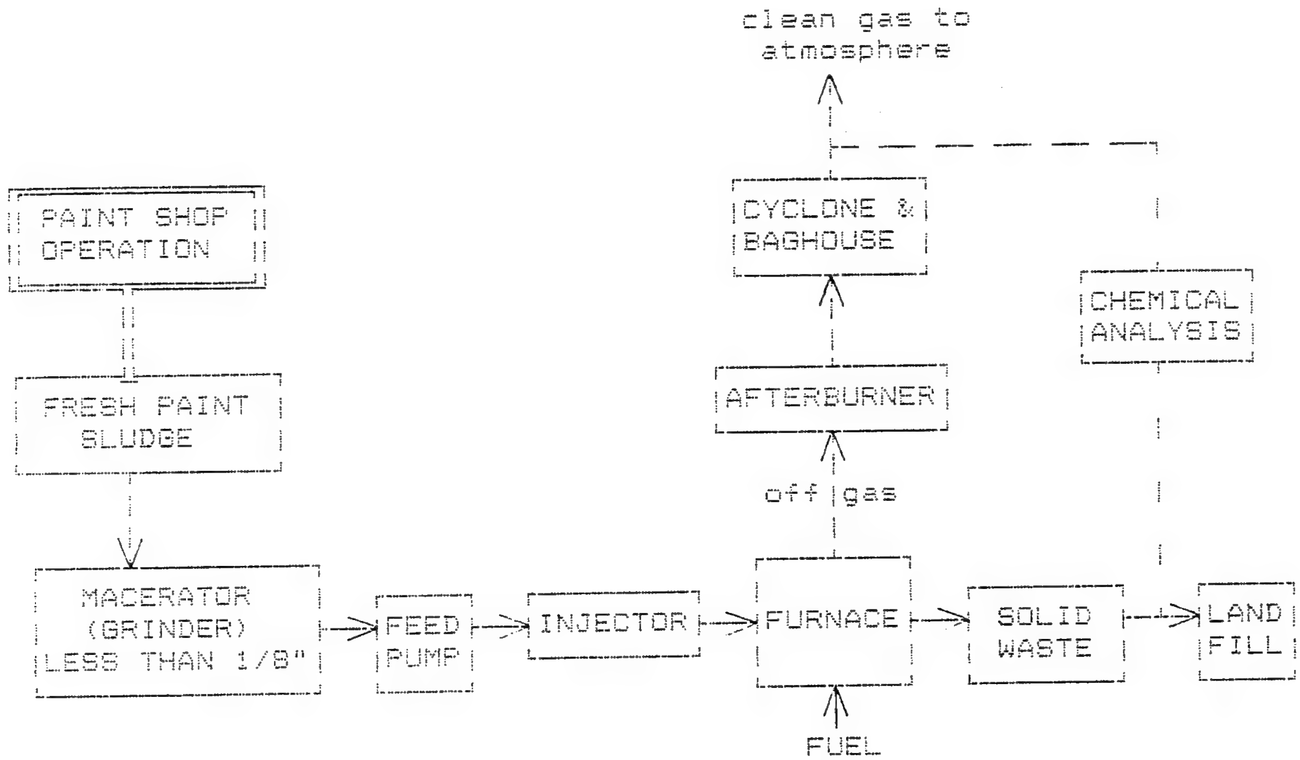
existing military furnace, such as the APE 1236 Deactivation Furnace, can be used to reduce the amount of paint sludges for disposal, (2) a significant reduction in weight and volume of the paint sludges can be achieved within the environmental constraints, and that (3) the process developed is cost effective and would produce a considerable savings to the government.

2. The results of the feasibility study showed that all three objectives can be achieved. It was found that the APE 1236 Deactivation Furnace can be used without modifications in its configuration or in its normal operational procedures. Approximately 90% weight reduction was achieved with a preliminary testing procedure. A very preliminary economic analysis indicated that about one million dollars, excluding capitalization, maintenance, etc., would be saved by the Tooele Army Depot each year at current production levels by processing paint sludge. Based on these results, a pilot study has been formulated to demonstrate that paint sludge can be fed continuously into the furnace. The pilot plant is a feed system only and no furnace modifications are required. It is desired to define the necessary equipment, controls, and procedures which would be used to design production mode equipment. The final production mode process equipment will consist of a portable unit that can be assembled and dismantled on demand. This unit will be designed to process all of the paint sludges produced at the TEAD facilities. A schematic flow chart for the pilot study is given in Figure 10.

a. Basic Equipment, Layout, and Test Procedure

There are five (5) major components in the process equipment used in the pilot study. Some of the equipment is rented and some purchased for this project. A brief description of equipment and operations is given in this section. A three dimensional process equipment layout is shown in Figure 11.

(1) Transfer Pump - Paint sludge, received in 55 gallon drums from the Paint Shops will be stirred to produce a homogeneous mixture and pumped into a macerator unit.



FLOW CHART

Figure 10

Process concept flow chart of pilot study

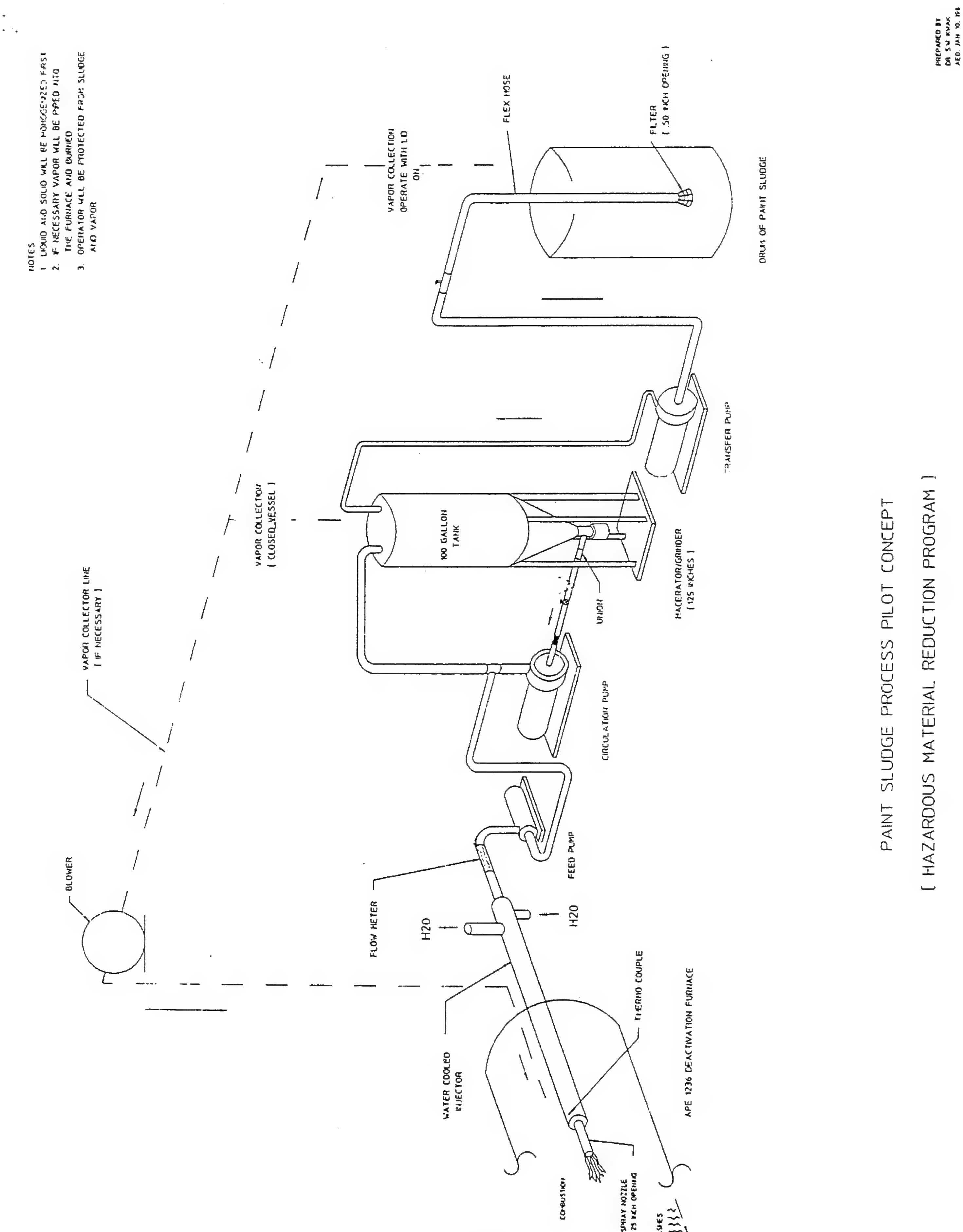


Figure 11
Schematic diagram of process equipment layout

(2) Macerator - In this unit lumpy solids in the paint sludge will be broken and mixed to a slurry containing particles smaller than 1/8 inch in diameter.

(3) Circulation Pump - The paint sludge will be continuously pumped through a feed metering pump loop and then back to the macerator unit. This continuous pumping of the paint sludge is necessary to keep the sludge in a homogeneous suspension.

(4) Feed Pump - The consistency of the paint sludge requires a special metering pump which would accommodate the unique physical characteristics of the material. The pump is constructed with a stainless steel stator (lined with Viton) and a special alloy rotor, which pushes the material along the length of the tubular cylinder pump body. Industries handling peanut butter and other similar materials, use this type of pump.

(5) Feed Injector - A water cooled, double walled paint sludge injector was constructed from stainless steel. It is water cooled to eliminate, or minimize, the premature evaporation of highly volatile organic solvent from the sludge in the injector. Experience indicates that this type of sludge/slurry has a tendency for hardening, sedimentation, and plugging the injector line and nozzle, requiring frequent system disassembly for cleaning. A schematic diagram of the feed injector is shown in Figure 12.

(6) Safety - All test personnel will be educated and thus protected from unnecessary exposure to harmful chemical compounds and fumes by strictly adhering to the prescribed industrial safety standards and procedures, including personal protective equipment. Solvent vapor will be collected and vented through an appropriate ventilation system, if necessary.

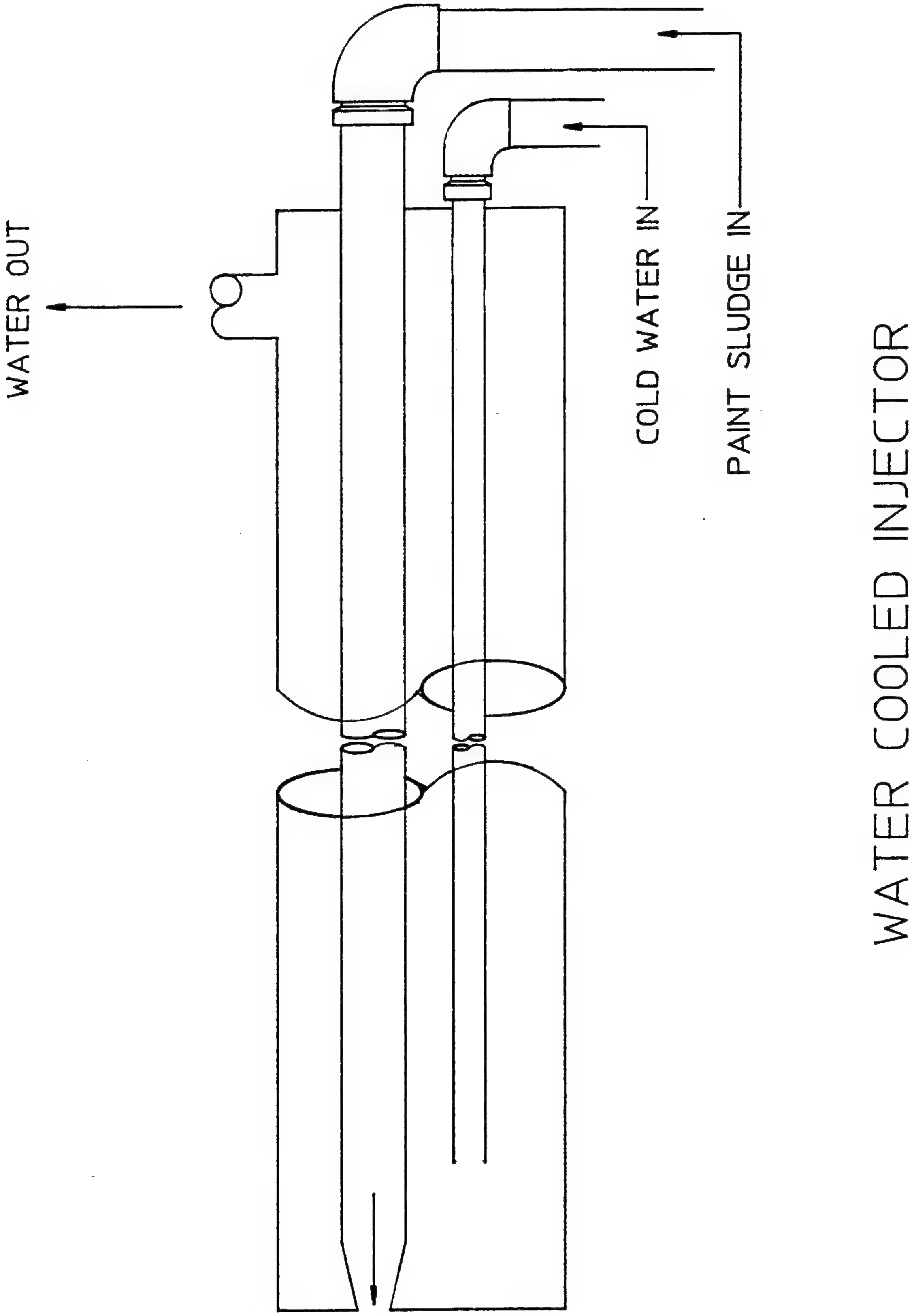


Figure 12

Schematic diagram of feed injector

b. Anticipated Results

The pilot study process and the process equipment were carefully designed and selected to achieve optimum results. Special attention was given to the unique chemical and physical characteristics of the paint sludges while designing the pilot process system.

(1) Handling - The bagging of the paint sludge is a labor intensive operation. In the pilot system, the sludge will be pumped from the drums into the macerator unit. After homogenization the paint sludge will be circulated through pipe lines, which eliminates the manual work that is associated with the bagging operation.

(2) Feeding - A special feed pump has been purchased for this project. The paint sludge feed stock will be metered into the furnace at a relatively low pressure, producing a small granular residue after the burning is completed. The feed rate can be adjusted while conducting the incinerator tests.

3. With this new system, it is anticipated that the feed rate may be increased by 50% to 15 pounds or more per minute. The new system will deliver a smoother and steady flow of the paint sludges and eliminate surges and fugitive emissions. The incineration parameters obtained in the pilot plant can be used to design the production system.

c. Quantitative Measurements

Throughout the testing done during the pilot study, all parameters, stream flows, stack emissions, etc., will be monitored. These data will enable a more accurate analysis of the economics and feasibility of the final process.

d. Pollution Monitoring

A sufficient quality and quantity of data will be gathered to assess the environmental impact of paint sludge incineration, and to determine if

a permit for the process can be obtained. It would be advantageous for trial burn testing for this process to be included with the testing for the furnace upgrade which is scheduled for September 1989.

ECONOMIC ANALYSIS

1. It is reported that about 39,000 gallons of various paint sludges and related solvent items will be produced at TEAD and disposed of through commercial contractors in 1989. Among these wastes the most costly item for disposal is polyurethane paint sludge because of the large quantity of 28,000 gallons that is generated.

2. This economic analysis will be limited to a discussion of the disposal cost of polyurethane paint sludge to illustrate the savings that can be realized by in house processing. The average density of polyurethane paint sludge is 13.85 pounds per gallon, and the disposal cost to TEAD is $3.07/lb, as reported by Environmental Management Office (see Appendix).

3. The following calculations demonstrate the costs and savings. This computation does not include the expenditures for storage, transportation, maintenance, administrative, and overhead costs.

Total pounds of sludge to be disposed is

28,215 gals X 13.85 lbs/gal = 390,778 lbs.

At $3.07/lb, disposal cost to TEAD is

390,778 lbs X $3.07/lb = $1,199,688

4. If TEAD decides to use the weight reduction process on paint sludge in-house, the cost of the process can be calculated. Again the hidden expenditures are not considered for this simplified computation.

5. Should the pilot study prove that approximately 15 pounds of the sludge can be processed per minute (11 pounds per minute feed rate is

already established in the preliminary tests), then the total hours required for processing 390,778 lbs of polyurethane paint sludge is:

390,778 lbs X (min/15 lbs) X (hr/60 min) = 434 hrs

Labor cost for two operators at $19.21/hr rate is

434 hrs X $19.21/hr X 2 = $16,674

Diesel fuel cost to operate the furnace, including the afterburner at the consumption rate of 55 gals/hr and at a cost of $0.94/gal is

55 gals/hr X 434 hrs X $0.94/gal = $22,438

Cost of electrical power at $0.07/kwhr

120 kw X 434 hrs X $0.07/kwhr = $3,646

Total operating costs:

Labor	$16,674
Fuel	$22,438
Electrical	$ 3.646
Total	$42,758

Increasing the operating cost by 30% to cover preparation for operators and equipment

30% X $42,758 = $12,827

Total in house costs would be

$12,827 + $42,758 = $55,585

6. During these tests, many samples of paint sludge were incinerated, with detailed data kept on the initial sample weights and the final

residue weights (Table 2). When the data were averaged, the final residue was found to be 10.29% of the initial weight of the paint sludge. 10% will be used for calculations.

The amount of final residue after incineration is

10% X 390,778 lbs. = 39,078 lbs.

The cost of disposal of this residue at $3.07/lb. is

39,078 lbs. X $3.07/lb. = $119,970

Total cost is

$119,970 + $55,585 = $175,555

Therefore the savings to TEAD is

$1,199,688 - $175,555 = $1,024,133

7. Although this savings excludes maintenance and capitalization of the furnace as well as storage, administration and overhead costs, the savings is significant enough to warrant continued efforts in developing and testing the pilot plant equipment at AED's furnace test site.

CONCLUSIONS AND RECOMMENDATIONS

1. Conclusions

a. The results of the feasibility study substantiated the project concept. The Army's standard furnace, the APE 1236 Deactivation Furnace, equipped with the necessary pollution control system is adequate for the reduction in weight of paint sludges by incineration.

b. During the feasibility tests, a feed rate of 11 pounds per minute was achieved. Approximately one drum of paint sludge can be processed through the furnace each hour.

c. It is anticipated that the feed rate may be increased to 15 pounds or greater per minute when the proposed pilot equipment is tested. This projection is based on the fact that the sludge will be continuously metered, which facilitates improved steady state combustion, elimination of fluctuations of the combustion zone in the furnace, and efficient utilization of the draft.

d. Substantial paint sludge weight reduction was achieved during the feasibility tests. An average of about 90% of the paint sludge was burned off, leaving 10% incombustible fine granule solids as incineration ash. The residue, which consists of inorganic pigments and inert filler materials and some heavy metals, can be disposed of as hazardous waste for landfill operations through commercial contractors.

e. Cost effectiveness of the process has been addressed in a very preliminary economic analysis which excludes capitalization, overhead, and maintenance costs. This analysis concludes that a significant savings (about one million dollars) can be realized by Tooele Army Depot each year at current paint sludge production rates.

2. Recommendations

It is recommended that the pilot scale study be implemented so that the full scale process can be developed and the economics can be verified. The pollution emission measurements which may affect the operating constraints and determine the permitability of the process should also be considered.

APPENDIX

This table lists the estimated CY 1989 costs for disposal of the major waste streams at Tooele Army Depot. These figures are based on 1987 or 1988 waste rates and 1989 disposal costs.

CY 1989
(Estimated)

Waste Description	Unit Cost	Estimated Annual Amount	Estimated Annual Cost	Waste Hazard Codes MSCIRBD
Alodine (Alodyne)	$1.86/gal.	5400 gal*	$10,044	M C R
Blast Grits	$0.14/lb.	337760 lbs.	$47,287	M B
Carbon Removing Compound	$2.07/gal.	3355 gal	$ 6,945	S
Enamel Paint Sludge	$1.36/gal.	1100 gal	$ 1,496	S I B
Gasoline	$1.41/gal.	1540 gal	$ 2,171	M I B
Lacquer Thinner	$3.47/gal.	1650 gal	$ 5,725	MS I BD
Paint Dust Waste	$2.07/gal.	1045 gal	$ 2,163	M
Paint Stripper	$2.27/gal.	1595 gal	$ 3,621	S
Paper Paint Filters	$2.07/gal.	6545 gal	$13,548	M B
Phosphoric Acid	$1.86/gal.	8784 gal	$16,338	M C
Photographic Developer	$2.16/gal.	60 gal	$ 130	M
Plating Solution	$1.86/gal.	1600 gal	$ 2,976	C
Polyurethane Paint Sludge	$3.07/lb.	28215 gal	$1.2 mil.	MS RB
Polyurethane Paint Thinner	$3.47/gal.	8965 gal	$31,109	S I BD
Smut-Go	$1.56/gal.	3080 gal	$ 4,805	M
Sodium Hydroxide	$1.36/gal.	52062 gal	$70,805	M C
Sulfuric Acid Electrolyte	$1.86/gal.	1980 gal	$ 3,683	M C
1,1,1-Trichloroethane	$2.07/gal.	6875 gal	$14,231	MS D

* This amount is high for 1988 because of the cyanide concerns earlier this year.

CODES:

M - Heavy metal concentrations (e.g. lead, arsenic, mercury, chromium)

S - Hazardous waste listed solvents (e.g. methylene chloride, xylene)

C - Corrosive hazardous wastes (i.e. high or low pH values)

I - Ignitable hazardous wastes

R - Reactive hazardous wastes (i.e. materials containing cyanides or sulfides or materials which readily combust or explode in air, water, or when exposed to an ignition source)

B - Materials which have the potential to be reduced in volume or provide heat energy when they are incinerated.

D - Wastes which have the potential to be distilled and recovered.

FORSCOM
Ft. AP Hill

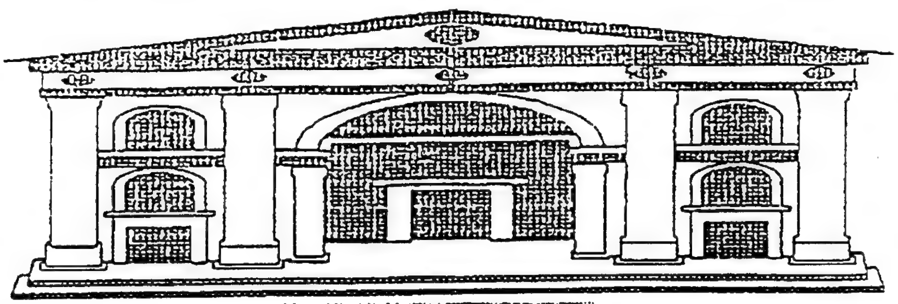
The following literature is in reference to:

Project #	**Project Title**
46	Waste Oil Vacuum Truck

Waste Oil Pumptruck
(FY 89)
ADL# ~~86~~ 46

Directorate of Engineering & Housing

Fort A.P. Hill, Bowling Green, Virginia, 22427-5000



To: NAME: Colette Lamontgne
ORGANIZATION: ________
OFFICE SYMBOL: ________
FAX# (DSN): ________
(COMM): 617-498-7221

TOTAL PAGES INCLUDING COVERSHEET: 9

FROM: NAME: T. Banks
ORGANIZATION: Environmental Office
PHONE #: (DSN) 578- ________
(COMM) (804) 633- 8255
FAX# (DSN) 578-8443
(COMM) (804) 633-8443

PLEASE VERIFY RECEIPT:(DSN) 578-8278
(COMM)(804) 633-8278

SOLICITATION, OFFER AND AWARD

1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 350) — RATING: See L11 or 120 — PAGE 1 OF 60 PAGES

2. CONTRACT NO: DLA7 30-90-C-8062

3. SOLICITATION NO: DLA730-90-R-7023

4. TYPE OF SOLICITATION: ☐ SEALED BID (IFB) ☒ NEGOTIATED (RFP)

5. DATE ISSUED: 90Jan18

6. REQUISITION/PURCHASE NO: See Section B

7. ISSUED BY — CODE SC0700

DEFENSE CONSTRUCTION SUPPLY CENTER
ATTN DCSC-P
3990 E BROAD STREET
P O BOX 16704 COLUMBUS, OHIO 43216-5000
For Post Award Contact – See G01

8. ADDRESS OFFER TO (If other than Item 7)

DEFENSE CONSTRUCTION SUPPLY CENTER
ATTN: CONTRACTING AND PRODUCTION
BID OPENING ROOM 103, BLDG 12-1B
3990 EAST BROAD STREET
P.O. BOX 16653
COLUMBUS, OHIO 43216-5009

NOTE In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder"

☐ SPECIAL REVIEW ☐ FMS REQUIREMENT

SOLICITATION

☐ Award issued pursuant to the Small Business Competitiveness Demonstration Program — 05

9. Sealed offers in original and NO copies for furnishing the supplies or services in the Schedule will be received at the place specified in Item 8, or if handcarried, in the depository located in Bid Opening Room, Bldg 12-1B, Room 103 until 1:00PM local time 90Feb20 (Hour) (Date)

CAUTION – LATE Submissions, Modifications and Withdrawals: See Section L, Provision No 52 214-7 or 52 215-10. All offers are subject to all terms and conditions contained in this solicitation.

10. FOR INFORMATION CALL — A. NAME: D. BEHRENS DCSC-P MC — B. TELEPHONE NO (Include area code) (NO COLLECT CALLS): A/C 614-238-2658

11. TABLE OF CONTENTS

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OFFER (Must be fully completed by offeror)

NOTE Item 12 does not apply if the solicitation includes the provisions at 52 214 16, Minimum Bid Acceptance Period. See Provision K19

12. In compliance with the above, the undersigned agrees, if this offer is accepted within (See Note Above) calendar days (60 calendar days unless a different period is inserted by the offeror) from the date for receipt of offers specified above, to furnish any or all items upon which prices are offered at the price set opposite each item, delivered at the designated point(s), within the time specified in the schedule.

13. DISCOUNT FOR PROMPT PAYMENT (See Section I, Clause No 52 232 8)

10 CALENDAR DAYS	20 CALENDAR DAYS	30 CALENDAR DAYS	CALENDAR DAYS
0 %	0 %	0 %	0 %

14. ACKNOWLEDGMENT OF AMENDMENTS (The offeror acknowledges receipt of amendments to the SOLICITATION for offerors and related documents numbered and dated)

AMENDMENT NO	DATE	AMENDMENT NO	DATE
NONE			

15A. NAME AND ADDRESS OF OFFEROR — CAGE CODE 0RDN8 — FACILITY 9U825

MUNICIPAL PIPE TOOL CO., INC.
515 - 5TH STREET - P.O. BOX 398
HUDSON, IOWA 50643

16. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print): STEVE GEARHART, PRESIDENT

15B. TELEPHONE NO (Include area code): 319/988-4205

15C. ☐ CHECK IF REMITTANCE ADDRESS IS DIFFERENT FROM ABOVE. ENTER SUCH ADDRESS IN SCHEDULE (L12)

17. SIGNATURE: [signature]

18. OFFER DATE: 2-14-90

AWARD (To be completed by Government) FOR POST AWARD INFORMATION SEE CLAUSE G01

19. ACCEPTED AS TO ITEMS NUMBERED: CLIN 0001

20. AMOUNT: $110,278.46

21. ACCOUNTING AND APPROPRIATION
☒ OTHER – See Sec G, Clause G03
( ) CG: 97x4961.5107 001-260 S33-181
( ) 97x4961.5107 001-22.1 S33-181 (Trans)
( ) FMS 9711x8242 L009 4U 8401 GBL S380000 (Trans)

22. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION
☐ 10 U S C 2304(c)( ) ☐ 41 U S C 253(c)( )

23. SUBMIT INVOICES TO ADDRESS SHOWN IN (4 copies unless otherwise specified) — ITEM BLOCK 25

24. ADMINISTERED BY (If other than Item 7) — CODE S1601A
CAS 161 DCASMA Cedar Rapids
1231 Park Place, Northeast
Cedar Rapids, IA 52402-1251
A/C 319-378-3200
CD Code B PAS Serial No. NONE

25. PAYMENT WILL BE MADE BY — CODE S2603A
DCASR St Louis
1222 Spruce Street
St Louis, MO. 63103-2811

26. NAME OF CONTRACTING OFFICER (Type or print): JACK A. MICELI

27. UNITED STATES OF AMERICA: Jack A. Miceli (Signature of Contracting Officer)

28. AWARD DATE: 90 AUG 31

IMPORTANT – Award will be made on this Form, or on Standard Form 26, or by other authorized official written notice.

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MIPR No. W26DJT-89-0146
FSC 4630

PURCHASE DESCRIPTION
SEWER CLEANER
(Diesel Engine Driven, Vacuum Tank, Jet Rodder)

1. Water tank:

a. Size: Minimum capacity, 1000 gallons.

b. Construction: Water tank will be constructed of 7 gauge corrosion and abrasion resistent copper bearing high strength steel suitable for welding, equal to ASTM-A242 or ABTH-A588. The interior of the tank will be provided with a coating of black asphalt, varnish or ZRC (cold galvanizing), an epoxy coating is also acceptable. Bafflers, manways-inspection ports and tank sediment drains will be included during the construction of the water tank.

c. Water fill adapter: Water tank will be equipped with a 2 1/2 inch hydrant hose adapter and an anti-syphon device for filling the tank using a hydrant. The fill adapter will be mounted on the curb side of the tank. A 30-foot long 2 1/2 inch diameter fire hydrant hose with couplings will be provided.

d. Level Gauge: A tank water level gauge will be provided within easy sight of the operator at the front of the truck.

e. Separator: A separator or strainer, that will remove from the hydrant water 98% by weight of solid, 74 microns or larger, shall be installed in the intake line between the anti-syphon device and the tank. The separator or strainer will be without moving or replaceable parts, and be equipped at its lowest end with a quick-acting ball valve for discharge of the solid matter.

f. Fill control valve: A manual valve shall be provided that allows filling the fresh water tank and the debris body with fresh water, simultaneously. The fill control valve will be placed between the anti-syphon device and the debris tank.

2. Debris/Body:

a. Capacity: Minimum capacity, 9 cubic yards.

b. Construction: Debris body will be constructed of 1/4 inch mild corrosion and abrasive resistant steel suitable for welding equal to ASTM-A242 or ASTM-A588.

c. Liquid return system A operator controlled excess liquid return system shall be provided that allows excess liquid in the debris body to be filtered and pumped back into the sewer at the rate of 80 GPM.

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d. Solid affluent removal: An ejector push plate is an acceptable method for removing solid from the debris body. A hydraulic or mechanical system will be provided that raises and holds the debris body door open during ejecting solid material from the debris body.

e. Debris body cleaning: A system that allows high pressure clean water flushing of the debris body from the inside will be provided. The debris body cleaning system will function at 2000 PSI with 20 GPM output minimum.

f. Debris body drain: A 6 inch debris body drain shall be located on the curb side of the truck that allows the operator to drain all excess liquid from the debris body using one manually controlled valve.

g. Controls: Ejector plate controls shall be located on the side of the truck away from the rear of the truck. The operator must be able to control door latch release and all ejection or duping functions without working around or near the rear door of the Debris body.

h. Level indicator: The debris body will be equipped with a visual indicator that indicates the level of debris in the debris tank. The debris level indicator shall be visible from the operator's area at the front of the truck.

i. Water recycling system: A water recycling system will be provided that removes water from the debris body, filters it and pumps it into the clean water tank. The water recycling system shall operate automatically and independently from other functions. The water recycling system will supply filtered water to the clean water tank at the rate of 70 GPM.

3. Vacuum pump:

a. Pump type: A rotary positive displacement root type vacuum pump is required.

b. Pump rating: Pump provided will be rated at 16 inches of mercury.

c. Pump performance unloaded: Pump will rated at minimum of 3000 CFM at 0 vacuum.

d. Pump performance loaded: Pump will be rated at minimum of 2500 CFM at 216 inches of water, (simulator maximum loading).

e. Pump drive: The pump drive system is at the option of the manufacturer, (is) PTO driven or separate engine driven. In

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the event a manufacturer elects to use a second engine to drive the vacuum pump, that engine will be compression ignition water cooled diesel fuel burning and properly sized to perform all required functions without overheating.

f. Suction line: The required size for the suction line is 9 inches, minimum.

4. Water pumps:

a. Pump type: A positive displacement high pressure pump equal to F. E. Meyers Co, model D6520AVD is required.

b. The pump provided will be capable of delivering 65 GPM at 2000 PSI minimum.

c. Pump will be capable of being run dry for a period of not less than 10 minutes without damage.

5. Hand gun system:

a. Equipment: A wash down system (hand-gun) will be provided that produces 20 GPM at 2000 PSI. Quick disconnect couplings will be installed on the truck to connect the wash down system to the hand gun, one quickcoupler at the front of the truck and one at the rear. One 25 foot long 1/2 inch inside diameter high pressure hose (4000 PSI bursting pressure) will be provided with male quickcoupler and hand gun.

6. Jet Rodder system:

a. Hose reel: A hydraulically powered hose reel will be mounted behind the cab of the truck capable of containing 800 feet of 1 inch inside diameter high pressure hose. The hose reel will be capable of rotating under power in a clock wise or counter clock wise direction. The directional control of the hose reel will be performed by foot pedals. The hose reel will be equipped with a hose footage counter clearly visible to the operator. A reel speed adjusting control will be located at the front of the truck within easy reach of the operator.

b. High pressure hose: The high pressure hose provided will be constructed of a single 600 foot long piece with an inside diameter of 1 inch. The proof pressure of the hose will be 4000 lbs. Normal operating pressure for the hose will be 2500 lbs. The jetrodder hose will come equipped with 3 nozzles. One nozzle will be a 1 inch by 30 degree, the other will be 1 inch by 15 degrees. The storm sewer nozzle for 1 inch hose will be equipped with replaceable spray jets and designed for use in 18 thru 36 inch pipe. Minmum burst pressure of 6.250 PSI is acceptable.

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c. Flow controls: A system of manual control valves conveniently located at the front of the truck will be used to determine quantity, direction and working pressure of the water used in jet rodding or pressure washing operations.

7. Hydraulic power boom:

Power-boom: A hydraulic boom with a 300 degree swing, 10 foot vertical lift, capable of lifting 1000 lbs. will be provided. The boom will be controlled by a remote electric push button station for all vertical and horizontal movement. The boom will support the vacuum hose.

8. Truck chassis:

a. Frame: The truck frame will be constructed of 110.00 psi straight channels with 15 inch design modulus minimum.

b. Dimensions: Cab to axle distance will be 134 inches. Cab to frame distance will be 181 inches.

c. Cab: Truck cab will be short conventional style.

d. Front suspension: Front axle will be rated at 12000 lbs. minimum.

e. Rear suspension: Rear suspension will be rated at 23000 lbs. minimum, and equipped with 4500 lbs. overload springs.

f. Brakes: Parking brake will be hand engaged automatic spring brake. Service brakes will be dual air/brake system with anti-lock Rendix Westinghouse or equal. Truck brakes shall conform to Federal motor carrier safety regulations 393.40 through 393.42 (b), 393.43 and 393.45 through 393.52 trailer couplings and trailer towing connections will not be provided on this truck.

g. Wheels and tires wheels will be 10 hole disk safety rims (budd type); two-piece wheels are not acceptable. Tires will have a rated capacity at least equal to the load imposed on each tire, measured at each wheel, at the ground, with the truck loaded to rated GVW. An assembled spare tire and wheel assembly will be provided (not mounted).

9. Power train:

a. Engine requirements: The engine will be compression ignition with 6 or more cylinders, liquid cooled and rated at 250 horse power minimum. The preferred engine is a 250 Cummins. Engine will use a glow plug system for cold weather

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b. Transmission requirements: Manufacturer's standard automatic transmission comparable with engine sizing. Preferred transmission is an Allison.

c. Axles: Front and rear axles will be the manufacturer's standard full floating type. Axle ratings shall be at least equal to the load imposed on each axle, measured at the ground, with the truck loaded to rated SVW. The rear axle may be a two speed type. Front wheel bearings will be wet type with oil level sight indicator.

d. Air compressor: An engine driven and engine lubricated 12 cfm air compressor will be provided. The air compressor may be air or water cooled.

e. Hour Meter: A time totalizing engine operating hour meter will be provided and mounted on the vehicle dash.

10. Truck cab:

a. Seats: Two individual fully adjustable air ride seats will be provided. Each seat will be equipped with a three point seat belt.

b. Air conditioning/heating system: Cab will be fully air conditioned and heated by an original vehicle manufacturer installed engine driven air conditioning/heating system with integrated heating or cooling system controls. Two 6 inch oscillating electric air circulating fans will be mounted near the center of the dash. Each fan will have individual off and on controls.

c. Steering: The steering system shall be full power hydraulic powered by an engine driven hydraulic pump.

d. Towing hooks: Vehicle recovery or towing hooks shall be provided as follows; two at the front of the truck, mounted to the frame in front of the bumper; one on each frame rail. Two recovery towing hooks will be provided at the rear of the truck, one on each frame rail as near to the rear of the vehicle as possible.

e. Sound levels: The interior sound level shall conform to federal actor carrier safety regulation 393.94. The exterior sound level will conform to the EPA noise emission standards for transportation equipment medium and heavy trucks.

f. Paint/undercoating vehicle will be cleaned, treated and painted in accordance with good commercial practice. The painting shall consist of not less than 1 coat of primer and 1

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coat of finish enamel. Painting shall be with the manufacturers current materials according to manufacturer's current process, except that the total dry film thickness shall not be less than 2.5 mils. The paint shall be free from runs, sags, orange peel, or other defects. The color shall be pastel green Dupont spec #45802L. The external cab floor and the underside of the fender wells shall be coated with a bituminous rust inhibitor.

11. Accessories:

a. The following accessories will be provided by the manufacturer:

(1) 12 volt hand held spotlight - 1 ea.

(2) Rotating yellow warning light mounted top of cab - 1 ea.

(3) Audible backup alarm (mounted) - 1 ea.

(4) Boom mounted spot light (mounted) - 1 ea.

(5) Hydraulic jack - 1 ea.

(6) Wheel lug nut wrench - 1 ea.

(7) Top roller hose guide - 1 ea.

(8) Quick clamps for 8 inch suction hose - 6 ea.

(9) Offset man hole roller - 1 ea.

(10) Sewer hose repair tools

(11) Lockable tool boxes

(12) Telescopic boom

(13) Catch basin serrated extension

(14) A quick connecting operator's suction tube handle

(15) Air purging system for blowing water out of system, preventing freezing.

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(16) High pressure hose reel tensioning device (for behind-the-cab reel only)

(17) Automatic excess liquid return system

(18) Fluidizing nozzles for vacuuming material below liquid level when distance from liquid level to top of tank exceeds 200.

(19) Pressurized debris removal thru reversing positive displacement vacuum pumps.

NOTE: DELETE ALL REFERENCES TO PROOF OF PRESSURE. IT IS NOT APPLICABLE TO THIS PURCHASE DESCRIPTION.

FORSCOM
Ft. Polk

The following literature is in reference to:

Project #	Project Title
54	Sediment and Soil Drying Beds

US Army Corps of Engineers
Construction Engineering Research Laboratory

#34

USACERL Special Report N-92/11
March 1992

Landfarm Technology at Fort Polk, Louisiana: Lessons Learned

by
Jackie L. Smith
James D. Grafton
Diane K. Mann

Changes in Louisiana's Solid Waste Rules and Regulations have ended the practice of disposing of contaminated soil in the landfill at Fort Polk. Regulations have also affected the disposal of sewage sludge from the installation. The projected costs for proper disposal of contaminated soils and sewage sludge led the Environmental and Natural Resources Management Division at Fort Polk to look at alternative and/or new disposal technologies. One such technology is landfarming, a treatment process in which waste is mixed with the surface soil and is degraded, transformed, or immobilized.

The objective of this project was to adapt landfarm technology to treatment of contaminated soil and sewage sludge at Fort Polk, LA. This report describes the project, and contains lessons learned during the process.

Mike,
Here's report we discussed 4 Feb 93. Any questions call me.
Jim Grafton

Approved for public release; distribution is unlimited.

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FOREWORD

This work was performed by the Environmental and Natural Resources Management Division, Fort Polk, LA, in conjunction with the U.S. Army Construction Engineering Research Laboratories (USACERL) Environmental Division (EN) under MIPR FE-0689, dated September 1989. The Fort Polk technical monitor was Dr. Charles Stagg (AFZX-DE-E).

Jackie L. Smith, an agronomist, serves as a Supervisory Environmental Scientist, and James D. Grafton is an Environmental Protection Specialist at Fort Polk. Appreciation is expressed to Dr. Charles Stagg, Chief Environmental and Natural Resources Management Division, Fort Polk, for the help and guidance provided during this study. Dr. Diane Mann, USACERL-EN, was the principal investigator. Dr. Ed Novak is the Acting Chief, USACERL-EN. The USACERL technical editor was Gloria J. Wienke, Information Management Office.

COL Daniel Waldo, Jr. is Commander and Director of USACERL, and Dr. L.R. Shaffer is Technical Director.

CONTENTS

LANDFARM TECHNOLOGY AT FORT POLK, LOUISIANA

1 INTRODUCTION

Background

Fort Polk, LA, is located in central Vernon Parish in West-Central Louisiana, about 6 miles southeast of the town of Leesville. In early 1983, a combination of factors prompted Fort Polk to explore alternatives for disposing of sewage sludge and contaminated soil. Changes in Louisiana's Solid Waste Rules and Regulations ended the practice of disposing of contaminated soil in the installation's landfill. Changing regulations were also affecting the disposal of sewage sludge. Previously, sewage sludge had been used along roads and in wildlife food plots, but a proposed state environmental regulation was going to require a solid waste permit for each area used for sludge disposal. The projected costs of proper disposal for contaminated soils and sewage sludge under the new regulations were the impetus for looking at alternative and/or new technologies.

The technology investigated in this research is landfarming, a treatment process in which waste is mixed with the surface soil and is degraded, transformed, or immobilized. The surface soil is used as the treatment medium and the process is based primarily on the principle of aerobic decomposition of organic wastes. Compared to other land disposal treatments such as landfills and surface impoundments, landfarming has the potential to reduce monitoring and maintenance costs, as well as cleanup liabilities. Because of these reduced costs and liabilities, and the relatively low initial and operating costs, landfarming has received much attention as an ultimate disposal alternative.

The Environmental and Natural Resources Management Division at Fort Polk asked the U.S. Army Construction Engineering Research Laboratories (USACERL) to assist with the landfarm project. The project is documented in this report because the technology may be of interest to other Army installations.

Objective

The objective of this report is to document landfarm technology as it was used to treat contaminated soil and sewage sludge at Fort Polk, LA.

Approach

The activities involved in site selection and the solid waste permitting process are discussed in Chapters 2 and 3, respectively. Landfarm operations and environmental monitoring are discussed in Chapters 4 and 5, respectively. Based on the successful operations as reflected by monitoring data, Fort Polk applied for and received a solid waste permit modified to allow recycling of the degraded material from the landfarm (Chapter 6). Chapter 7 contains lessons learned during this project and suggests some applications.

2 LANDFARM SITE

Site Selection

Site selection for a proposed landfill/landfarm complex at Fort Polk began in 1983. The complex would operate according to a solid waste permit issued under new Louisiana Department of Environmental Quality (LADEQ) Solid Waste Rules and Regulations. An area west of Chaffee Road and north of the intersection with Mill Creek Road was tentatively selected. This tentative selection was based on visual observations; clay soils were visible on the surface and plants indicative of heavy soils (hawthorn, native crabapple, and post oak) were abundant.

The U.S. Army Corps of Engineers, Fort Worth District, carried out the geohydrologic testing of the site. Borings were made on a 300 ft x 300 ft* grid to collect soils, geologic, hydrologic, permeability, and other site information. An isometric profile was created from the correlation of continuously sampled borings to depths of 40 to 50 ft, which is a minimum of 20 ft below the lowest proposed excavation point. Borings subsequently were backfilled with a cement-bentonite-water mixture to prevent contamination of groundwater.

Groundwater

The general direction of groundwater flow at the site is south. No water wells are operating, abandoned, or proposed within 1 mile of the site perimeter. Four freshwater aquifer units are located under the site at depths ranging from 480 to 1570 ft.

Surface Drainage

The landfarm site is completely outside of the 100-year floodplain. Surface drainage outside the landfarm is drained away from the site.

Geological Characteristics

The landfarm site is on an outcrop of a clay formation approximately 360 ft thick. Overburden at the site consists of a mantle of residual soil that is brown to light brown, very stiff, calcareous clay of high plasticity with minor amounts of sand. Frequently, it contains organic material. This soil averages 2 ft thick and covers the entire site.

Primary material underlying the overburden consists of very stiff to hard clay of high plasticity. It contains scattered lime nodules in varying concentrations and minor amounts of silt, fine sand, and carbonaceous material. Structurally, the clay is massive with scattered lenses and pockets of clayey silt, silt, and fine sand. Tight slickensides (polished, smoothly striated surfaces resulting from slippage along a fault plane) occur with moderate frequency and appear to be confined to clay zones of higher plasticity.

Environmental Characteristics

There are no known historical sites, recreational areas, archaeological sites, designated wildlife management areas, swamps, marshes, habitat for endangered species, or other sensitive ecological areas within 1000 ft of the site.

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* A metric conversion table is on page 18.

After analysis of the preliminary data, it was determined that the site met the criteria of the State of Louisiana for the siting of landfills and landfarms. Once this determination was made, the Fort Worth District prepared the application for a solid waste permit (see Chapter 3).

Construction

Construction of the facility began in late 1984. The site was cleared by shearing using a KG blade on a D-8 bulldozer. Shearing left the stumps and roots, which had to be grubbed using rippers on a large motorgrader. Grubbing was on 24-in. centers to a depth of 18 in.

The pond embankment and enclosing levee were constructed of material taken from an adjacent location. Clay soils used in constructing the pond embankment are characterized as containing slickensides. Soils having this characteristic are minimally acceptable for this use and may slump after several years, causing a maintenance problem.

A buffer zone of approximately 100 ft was created between the landfarm operational area and its boundary fence. This buffer area consists of a strip of cleared land and a strip of trees near the perimeter fence of the landfarm.

Layout and Security

Total area of the facility is 8.26 acres, which is enclosed by levees. Of the total area, 3 acres in the southeast corner are reserved for impoundment runoff. The landfarm usable area is 4.1 acres, subdivided into four working plots separated by a terrace (diversion), which reduces sheet flow and prevents the migration of material being degraded. All runoff water diverted by the terraces is dumped into a common grassed waterway and flows into the impoundment. Figure 1 is a diagram of the landfarm complex.

The surface impoundment was designed to retain rainfall/runoff from the landfarm area and as an irrigation water supply source. It was created by constructing an earthen embankment along the southern and eastern boundaries of the landfarm. A levee was installed along the northern and western boundaries of the landfarm to intercept and prevent offsite surface water from entering the area. To prevent overtopping of the embankment surrounding the impoundment, an emergency spillway was constructed. Sufficient natural clay is present to meet the thickness requirements of the barrier along the bottom and sides of the impoundment. Five groundwater monitoring well sites (three downgradient and two upgradient) were installed to assure that probable contaminant flow paths are monitored.

The east boundary of the landfarm is more than 100 ft from Chaffee Road, a major traffic route. Dense native vegetation of mixed pine and hardwood forest was left between the perimeter fence of the landfarm and Chaffee Road. The north and west boundaries of the landfarm are a common boundary with the sanitary landfill. The south boundary is undeveloped forest area.

Security of the landfill site is assured by a boundary fence of three-strand barbed wire with a single access point secured by lock and key. Signs are placed on the fencing to help prevent inadvertent entry by unauthorized personnel.

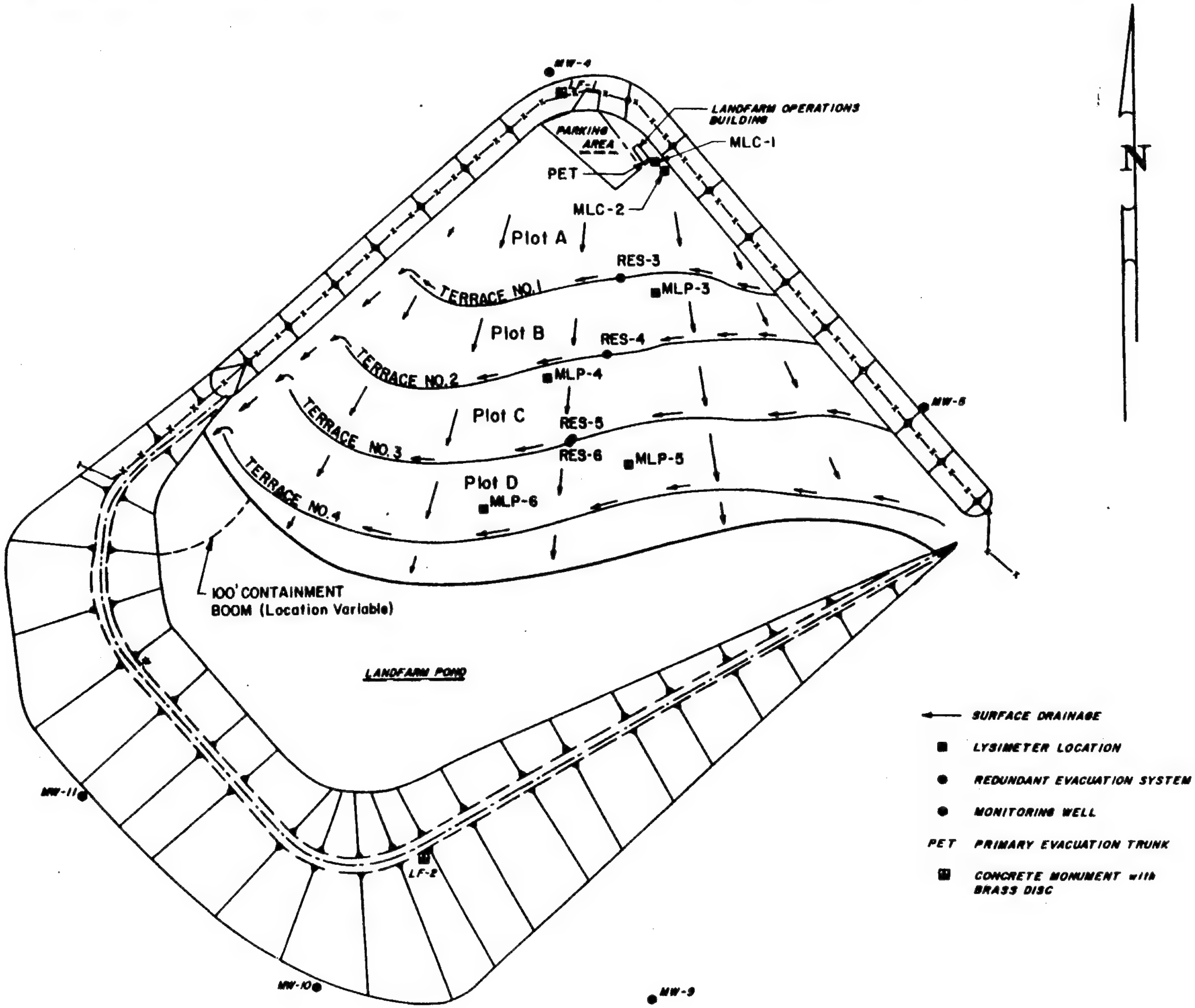

Figure 1. Fort Polk Landfarm Layout.

3 PERMITTING

Initial Permit Proposal

Before construction of the landfarm was completed in the late spring of 1985, resources and efforts had already been directed toward obtaining a joint solid waste permit for the landfarm and adjacent landfill site. The State of Louisiana would not consider a joint permit application. Consequently, the landfarm was permitted as a single entity. The Forth Worth District was contracted to prepare the application for a Solid Waste Landfarm Permit.

Permit Part I, a form from the Louisiana Department of Natural Resources Office of Environmental Affairs, was submitted in February 1985. Permit Part II, documentation of the proposed landfarm site and its operation, was completed in June 1985 and revised in October 1985. Major sections included in Part II were a master plan, facility specifications, an operational plan, an implementation plan, a monitoring plan, post closure data, and financial responsibility statements.

In addition to the site data (Chapter 2), information gathered for the Part II documentation included a "wind rose" from hourly wind data collected between January 1967 and 1976, and rainfall frequency.

Permit Limits

Like any solid waste permit, a landfarm permit will vary from state to state. However, this landfarm permit addressed security, safety/emergency situations, hydrological/drainage characteristics, geological/soil characteristics, environmental characteristics, facility plans and specifications, monitoring and operational procedures, and recordkeeping and closure information.

The Fort Polk landfarm permit detailed total weekly application rates for various wastes (oily-429 lb/acre, grit 1.1 cu yd/acre, and dried sludge 1.9 cu yd/acre). The method of application, recordkeeping systems, key personnel, training, and hours of operation were also specified. Extensive attention was given to the expansion of the Fork Polk's Installation Spill Contingency Plan (ISCP) to ensure safety/emergency requirements were satisfied. Prevention of salvaging and scavenging were also addressed along with other security measures.

4 OPERATIONS

Operation of the landfarm began in January 1986 after approval of the permit application. A control building with truck scales is located on the adjacent landfill property near the landfarm access point. All vehicles admitted to the landfarm are weighed. Weight tickets are accumulated and a landfarm operator picks up the records daily. Records are maintained at the Environmental and Natural Resources Management Division.

Personnel

The landfarm is operated by two people certified by the State of Louisiana as Class A landfarm operators. These people are responsible for all aspects of operation—both administration and labor. One additional operator has Class C certification and conducts only labor activities. The responsibilities of daily operation are rotated among the operators.

Training

A training program was established for all government employees involved in waste collection, transportation, and disposal. Training included the following subjects: recordkeeping, security, emergency procedures (including the Installation Spill Contingency Plan [ISCP]), landfarm operations (including limitations, equipment, irrigation, waste application, turfing, and landscape maintenance), inspection requirements, and leachate and vector control.

Loading

Fort Polk operates two waste water treatment plants; one at North Fort Polk and one at South Fort Polk. The North Fort plant has 4 operational digested sludge drying beds and the South Fort plant has 18 drying beds. The combined annual production of digested sewage sludge from both treatment plants is approximately 525 tons. Additionally, two drying beds at the South Fort wastewater treatment plant are used as the accumulation point for soil contaminated by petroleum, oils, and lubricants (POL) and for washrack sediments.

When the drying beds are cleaned, POL-contaminated soil, washrack sediments, or digested sewage sludge is loaded into dump trucks using a hydraulic, telescoping boom loader. The trucks travel approximately 5 miles to the landfill scales where they are individually weighed; the weights are recorded by truck number. The trucks then proceed to the landfarm, a distance of about 250 yards.

Trucks are positioned and dumped by the landfarm operator on duty. Each load is dumped so there is no travel through previously offloaded material. This prevents tracking of contaminated soil/sediments and sludge out of the landfarm.

Normal operations dictate that either all of the POL-contaminated soil/sediments or all the digested sewage sludge be transported and dumped at the landfarm before transporting and dumping the other material. The material received first is spread across the plot of application. Upon completion of the initial loading, the second material is brought in and dumped on top of the previously applied material. It is also spread to provide a uniform depth and loading across the entire plot. The material is then mixed using a windrow procedure. A crawler tractor, equipped with a four-way tilt blade, rolls both layers of

material into a windrow, then rolls the windrow back into the area originally occupied and spreads the material over the entire plot.

During off-loading, initial spreading, and mixing, all foreign objects (inorganics) are removed. The objects are accumulated in the bucket loader attachment of the tractor, weighed, and taken to the landfill for disposal. The weight of the foreign material is subtracted from the total weight of waste received. After spreading operations are complete, the crawler tractor used in this operation is cleaned on site with water from the impoundment using an irrigation pump as a power washer.

Use of standard farming equipment and other equipment (Table 1) helped reduce operational costs.

Degradation

The waste mixture is further mixed using the farm tractor and disc harrow. A few passes of the disc harrow with the cutters set almost straight helps locate any foreign objects missed during the initial screening. The cutters are then angled and the waste is mixed to maximum cutter depth.

Tilling is normally performed twice daily for the first 2 weeks using the PTO-driven roto-tiller. Frequency of tillage is weather dependent, and is performed as conditions permit during periods of inclement weather.

Occasionally, the digested sewage sludge has not completely dried; this dictates a number of minor operational changes because (1) the crawler tractor cannot mix and spread the material easily; it flows ahead of the blade; (2) the sludge behaves as a lubricant and reduces traction.

Table 1

Equipment List

1	Rubber tired tractor, John Deere 2550 w/bucket loader attachment
1	Disc harrow, TPH, 6 foot, 20 cutter
1	Roto-tiller, 6 foot, TPH, PTO-driven
1	Seeder/spreader, 800 lb capacity, TPH, PTO-driven
1	Ag Rain irrigation system, reel type, traveling sprinkler
1	Peg-tooth harrow, TPH, 10 foot
1	Box Blade, TPH, 6 foot
1	Rotary mower, TPH, PTO-driven, 6 foot
1	Vacuum pump (for evacuating soil pore water lysimeters)
1	Portable pump generator (to energize vacuum pump)
3	Fixed rain gauges
3	Movable rain gauges (for measurement of irrigation water)

TPH = three point hitch
PTO = power take off

ll farm equipment is manufacturer's standard equipment readily available from any farm equipment/implement dealer. ther equipment is also readily available from appropriate dealer/supplier. Commercial or trade names are cited for illustrative purposes. Neither the United States Government nor any agency thereof make any endorsement concerning the products.

This listing includes only equipment dedicated exclusively to landfarm operations.

If wet sludge is encountered, the crawler tractor is tracked back and forth through the material. Ruts created expose a larger surface area which speeds up the drying process. The rutting/drying process is continued, using the farm tractor, until the tractor can travel in a straight path when the tiller is attached. When the material has dried sufficiently, normal twice per day tilling is resumed.

Throughout the degradation cycle, irrigation, if required, is performed after tillage or on days when there is no tillage. Maximum microbial activity is encouraged if the waste mixture is never allowed to completely dry at any time during the degradation cycle. Approximately 1 in. of irrigation water per week is required at Fort Polk during periods of little or no rainfall. Table 2 shows the typical degradation cycle.

At the end of the first 4 weeks of intensive tillage, the interval is reduced to three times per week and tillage is continued for the next 4 weeks. Between the 8th and 10th weeks, a preliminary phytotoxicity test is performed to determine the intensity of future tillage. Prior to seeding, the soil/waste mixture is fertilized at a rate that will yield 32 lb actual nitrogen, 32 lb actual phosphorous, and 32 lb actual potassium per acre. Fertilizer is broadcast and incorporated into the soil/waste mixture. The soil/waste mixture is seeded with a rapidly germinating plant, browntop millet, at a rate of 35 lb per acre. The top of the mixture is slightly compacted to aid germination. If required, plots are irrigated every other day.

In Louisiana, browntop millet will normally germinate within 3 to 4 days and grow to a height of 2 to 4 in. within a week. If the planting exhibits acceptable establishment and growth, it is incorporated into the soil (per the permit requirements) by tilling and a tilling schedule of once per week is followed for approximately 12 to 14 weeks. Should the planting show diminished plant establishment or stunted, chlorotic plants, the planting is incorporated into the soil and a schedule of 3 times per week tillage is resumed. The preliminary phytotoxicity test is repeated at 2-week intervals until successful. Tillage is then reduced to once per week for the remainder of the degradation cycle.

After the reduced tillage increment, a final phytotoxicity test is performed using plants of the genus Brassica. Planting rates will vary according to species selected. The procedure is the same as for the preliminary test. If the test is not successful, tillage is resumed and the test is repeated periodically until successful.

Once a final phytotoxicity test is successful and all other permit requirements are met, the degraded material can be removed from the landfarm and used according to modifications to the permit (see Chapter 6).

Surface Impoundment

The surface impoundment is inspected weekly and after storms to detect evidence of deterioration of the levees, overtopping, malfunctions, or improper operation. If a leak is detected, the LADEQ Solid Waste Management Division is notified immediately.

Water in the surface impoundment is used to irrigate the landfarm plots when rainfall is limited. It is also used to clean equipment. This practice reduces the amount of material tracked off the site. It also eliminates the use of fresh water on the site and assures control over the washwater.

Table 2

Typical Degradation Cycle at Fort Polk, Louisiana

Sequence	Week After Loading													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Initial Loading Date (NLT 1 April)														
Tillage/Aeration 2/day	•	•												
Tillage/Aeration 1/day*			•	•										
Irrigation (as required)	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Tillage/Aeration 3/week					•	•	•	•						
Preliminary Phytotoxicity Test (Browntop Millet)									•					
Tillage/Aeration 1/week										•	•	•	•	•
Final Phytotoxicity Test (Brassica Species)														
Soil/Waste Mixture Sampling												•		
Fertilization									•					

Sequence	Week After Loading											
	15	16	17	18	19	20	21	22	23	24	25	26
Initial Loading Date (NLT 1 April)												
Tillage/Aeration 2/day												
Tillage/Aeration 1/day*												
Irrigation (as required)	•	•	•	•	•	•	•	•	•	•	•	•
Tillage/Aeration 3/week												
Preliminary Phytotoxicity Test (Browntop Millet)												
Tillage/Aeration 1/week	•	•	•	•	•	•	•	•	•	•		
Final Phytotoxicity Test (Brassica Species)											•	•
Soil/Waste Mixture Sampling												•
Fertilization											•	

* Assuming receipt of dry digested sewage sludge.

5 MONITORING

The permit requires monitoring of groundwater, soil pore water, *in-situ* soils, soil/waste mixture, surface water impoundment, and plant growth. Baseline analyses were made for groundwater and soils before introducing wastes into the facility. Operational analyses are compared to baseline data after each sampling episode. All groundwater monitoring wells, soil pore water lysimeters, and the surface impoundment are sampled and analyzed semi-annually for iron, chloride, specific conductance, pH, total organic carbon, total dissolved solids, nitrate, and total nitrogen. Soil pore water is monitored by glass block lysimeters. Two are located outside the application area and four are located within the area of waste application. In addition to the analyses stated for groundwater, soil pore water is analyzed for nickel, cadmium, copper, zinc, and lead.

In-situ soil with which wastes will be mixed are sampled before application of wastes. Two areas within each plot are randomly selected and sampled at the depth of 0 to 6, 6 to 12, 12 to 24, and 24 to 36 in. Each sample interval is analyzed for cation exchange capacity, pH, total nitrogen, organic matter, salts (calcium, magnesium, sodium, aluminum, iron), nickel, cadmium, copper, zinc, and lead. The soil/waste mixture is sampled immediately after initial mixing and near the middle and end of the degradation cycle. Samples are collected from two areas of each plot and are analyzed for the same parameters as the *in-situ* soils.

Agronomic monitoring is accomplished by phytotoxicity testing and plant tissue analyses. (Phytotoxicity testing is discussed in Chapters 4 and 6.) Plants from the final phytotoxicity test are collected and analyzed for nickel, lead, copper, zinc, and cadmium. All analyses to date have shown no uptake of these metals.

Analytical results are reported to LADEQ annually. All test results have been within limits set by LADEQ Solid Waste Rules and Regulations and no deficiencies have been found during quarterly on-site inspections by LADEQ inspectors.

6 RECYCLING

Permit for Recycling

At the time the permit was prepared, the possibility of recycling the degraded material was not considered. The permit required the facility to have a finite lifespan; operations would cease on 1 November 1993 and have a final closure date of 1 April 1994.

Phytotoxicity testing had been conducted since completion of the first degradation cycle and the plants were very responsive to the degraded mixture. This testing was not required by the permit application but was initiated as a mechanism to determine the completeness of the degradation cycle. Plant tissue sample analyses had shown that plants growing on the degraded material did not uptake heavy metals when compared to the control sample data. Based on these and other indicative analytical data, it was decided to request a permit modification that would allow reuse of the degraded material.

It was proposed to the LADEQ that the degraded material be removed from the facility after certain conditions had been met. First, the soil/waste mixture would undergo degradation in the plots for a period of not less than 6 months and the degradation cycle would be concluded only when (1) heavy metals were below threshold values, defined in Louisiana Solid Waste Rules and Regulations, in the degraded material matrix, (2) organic matter content of the degraded material was at least 3 percent over native soil, (3) degraded material texture (U.S. Department of Agriculture classification) by field determination was sandy loam or finer, and (4) a successful field growth test (phytotoxicity test) of the degraded material had been completed using plants affected by petroleum waste application, such as the genus Brassica.

It was also proposed that factors to be evaluated during field growth testing would be (1) germination, (2) plant vigor, (3) uniformity, and (4) response to nutrients. A rating scale of 0 (none) to 5 (good) would be used and rating of all factors must be 3 or greater before the field growth test could be considered successful and the degradation cycle concluded.

It was also proposed that all field growth testing and evaluation be performed by an agronomist and, at the end of the degradation cycle, the treated material would be removed from the facility and used as an amended topsoil for establishment of vegetative cover on the active landfill and a closed landfill. These sites were chosen because they are within controlled access areas that are monitored under provisions of the State of Louisiana Solid Waste Rules and Regulations.

The closure plan was also addressed and it was proposed to delete stated closure dates and substitute the following closure plan: (1) landfarm operations will cease if maximum applied metals in the upper 12 in. of the *in-situ* soil with which the waste will be incorporated reach limitations specified by the State of Louisiana Solid Waste Rules and Regulations; (2) date of final closure will be determined by limitations specified in (1) above. The Assistant Secretary LADEQ will be notified immediately if specified limitations are reached. Notification will include the actual or proposed closure date.

These proposed modifications were presented to the State of Louisiana, Department of Environmental Quality in early June 1989 and approval was granted in early November 1989. Degraded material is now being removed and used in accordance with provisions of the permit application.

Effects of the Permit Modification

The modified permit:

1. Allows the Fort Polk landfarm to better comply with the intent of the Resource Conservation and Recovery Act (RCRA) which stresses alternatives, such as recycling, to disposal.

2. Allows the facility to become a recycle facility with an indefinite lifespan, rather than being a disposal facility with a finite lifespan.

3. Provides an amended topsoil/soil amendment for establishing vegetative cover on the active and closed landfill, which will minimize soil migration and improve integrity of the capped areas.

4. Delays closure of the facility indefinitely; closure is dictated by reaching certain threshold values rather than a stated date whether or not the assimilative capacity of the facility has been reached.

5. Reduces the cost of offsite disposal. Table 3 lists the estimated costs Fort Polk would have paid for offsite disposal based on the actual weight of soils and sludge disposed of at the landfarm. In addition to the tipping fees for pure disposal, the offsite costs include contract and operational costs for a commercial hauler. By using landfarm technology, Fort Polk has reduced pure disposal costs to almost zero. The installation still must cover the costs of onpost transportation and administration, but tipping fees are no longer an operating cost.

Table 3

Estimated Costs for Offpost Disposal of POL Contaminated Soils (POLCS) and Digested Sewage Sludge (DSS) in Louisiana

Time Period	Weight (tons)	POLCS/DSS Classification	$ Amount
Jan 87 - Jun 87	333.20 900.00	POLCS DSS	44,982.00 121,500.00
Jul 87 - Jun 88	1055.10 795.09	POLCS DSS	142,438.50 107,337.15
Jul 88 - Jun 89	1792.80 350.00	POLCS DSS	242,028.00 47,250.00
Jul 89 - Jun 90	1659.94 583.51	POLCS DSS	224,091.90 78,773.85
Jul 90 - Jun 91	727.63 0	POLCS DSS	98,230.05 -
	Grand Total through Jun 30, 1991:		$1,106,631.45

7 SUMMARY AND LESSONS LEARNED

Summary

The landfarm technology discussed in this report is a practical and successful method of treating contaminated soil and sewage sludge at Fort Polk, LA.

Site selection included evaluation of groundwater resources, surface drainage, and geological and environmental characteristics. The facility is enclosed by levees that prevent offsite water from entering the area and that retain rainfall/runoff from the landfarm area. The water in the surface impoundment is then used for irrigation and to clean equipment used on the site. The site is also enclosed by a three-strand barbed wire fence to help prevent unauthorized entry.

Because the original permit for a combined landfill/landfarm complex was not approved by the State of Louisiana, the landfarm was permitted as a single entity. Based on the results of monitoring during operation, Fort Polk applied for and was granted a permit modification to allow recycling of the degraded material from the landfarm. The material is now removed from the facility and used as a soil amendment on the active adjacent landfill and a closed landfill.

Lessons Learned

Using offsite borrow for the pond embankment resulted in a pond with a very shallow side. Overgrowth of vegetation is becoming a problem. Storage capacity of the impoundment would have been increased and the vegetation problem reduced if this side were deeper. This factor should be considered during the planning/construction phases at other landfarms.

Initially, it was determined that loading would be done in 10-ft wide contoured strips within each plot. This proved to be impossible. Positioning trucks for unloading is very difficult, and when material was spread to an even thickness it would often be moved outside the strip. An amended layout and loading procedure is recommended for other landfarms.

The permit initially allowed grasses (bermuda, bahia, ryegrass) which are very tolerant to hydrocarbons to be planted on the degraded material. This was changed to plants that are sensitive to and are affected by petroleum wastes. This gives a more accurate indication of completeness of degradation. The use of species sensitive to petroleum/hydrocarbons is recommended at other landfarms.

A carbon-nitrogen ratio of 10:1 in the soil/waste mixture should be maintained as nearly as possible/practical for efficient degradation.

Equipment used should be cleaned on site.

For best initial spreading, a crawler tractor is used. Later spreading is fine-tuned using a box blade and rubber-tired tractor.

At the beginning of operations, soil/waste mixture samples were composited by plot. The composite yielded only a single value and did not reflect the range of values that occurs in the mixture. Several samples from separate locations within the plot should be taken to establish a range of parameter values for the soil/waste mixture.

Applications

Potential Army-wide benefits from the landfarm method used at Fort Polk include:

- The use of naturally occurring microbes allows landfarming to be conducted in various climates.

- The use of standard farming and other equipment improves equipment accessibility and helps maximize cost savings.

- A variety of control/test methods can be used to satisfy local and state environmental concerns and regulations.

- The cost benefits of operating a landfarm versus paying for offsite disposal are easily quantified.

- Operating a landfarm in a recycling mode of operation offers the possibility of long term financial benefits.

METRIC CONVERSION TABLE

1 acre	=	0.405 hectare
1 cu yd	=	0.765 m^3
1 ft	=	0.305 m
1 in.	=	2.54 cm
1 lb	=	0.454 kg
1 mi	=	1.61 km
1 yd	=	0.914 m
1 ton	=	907.2 kg

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Project #	Project Title
58	Development of Econ Analysis Model
59	Hazardous Material Tracking System
60	Intra-Government Personnel Act
61	Software Conversion for Comp w/AAEMIS
62	Integrated Hazardous Material Plan

58, 59

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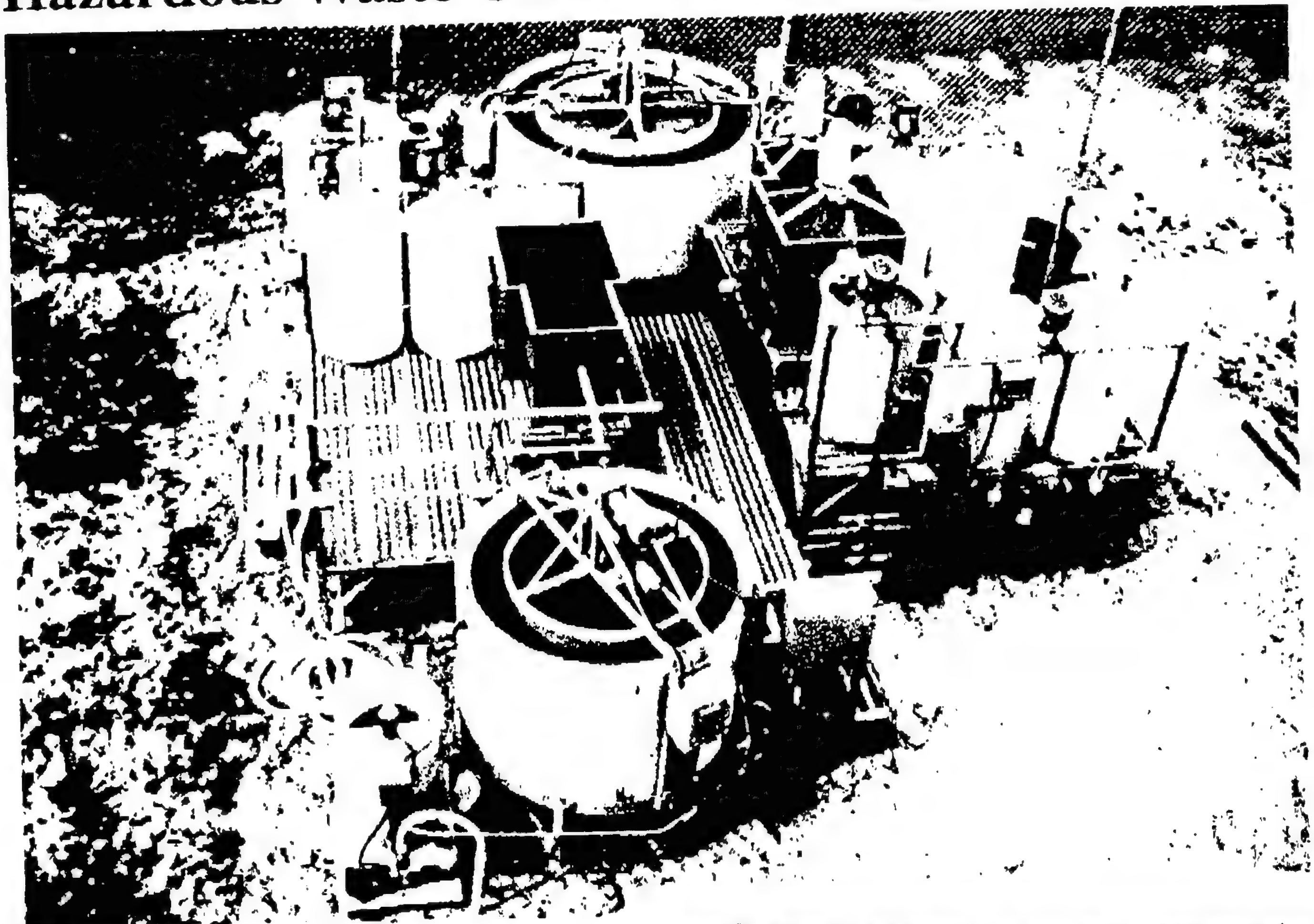

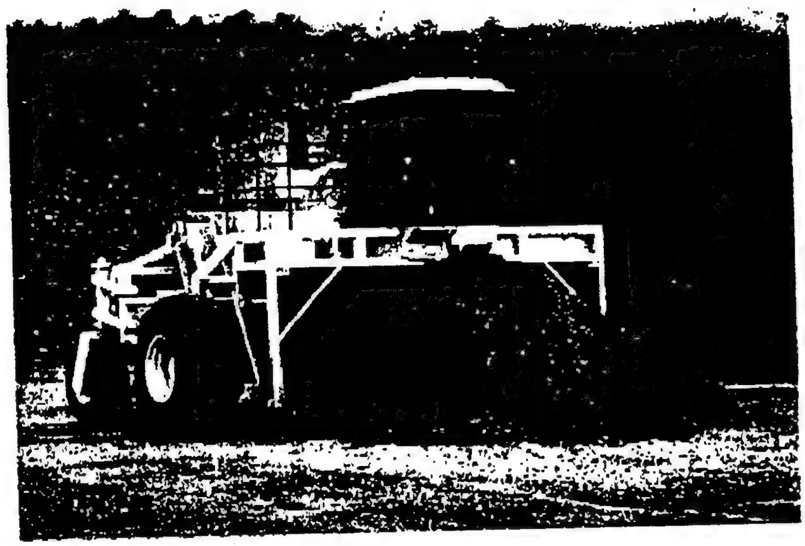

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114. HAZARDOUS WASTE MINIMIZATION ASSESSMENT

Category: II.g. Management strategies.

Purpose: Development of a hazardous waste minimization plan for Army installations to include the actions necessary to accomplish reduction in volume and toxicity of hazardous wastes generated.

Application: This protocol was developed for waste minimization of items disposed of on military installations such as storage batteries, solvents, used oils, antifreeze, paint waste, etc.

Description: The strategy for minimization on Army installations is the development of a protocol for surveying each installation for hazardous waste streams and methods of disposal. These major categories are the approach taken for surveying installations with this protocol:

1. Review information available at the installation.
2. Talk to several groups of individuals.
3. Develop a list of waste streams and rank them.
4. Develop information on each waste stream.
5. Identify minimization options for each waste stream.
6. Evaluate and rate options (preliminary or first screen) for each waste stream.

Advantages: There has been a reduction in hazardous waste generation and disposal on Army installations where it has been used.

Limitations: It can not be used on all types of waste.

Cost: A survey at Ft. Riley, KS, cost $70,000 for a 1 year study. Cost at other military installations will be site specific.

Availability: Available at USACERL.

Status: This protocol has been applied at several Army installations: Ft. Ord, CA, Ft. Campbell, KY, Ft. Meade, MD, Ft. Carson, CO, and Ft. Sam Houston, TX. A full-scale survey will be implemented at Ft. Riley during 1992.

References:

Dharmavaram, S., D.A. Knowlton, and B.A. Donahue. **Hazardous Waste Minimization Assessment: Ft Carson, CO**, USACERL Technical Report N-91/02, Jan 1991.

Dharmavaram, S. and B.A. Donahue. **Hazardous Waste Minimization Assessment: Fort Meade, MD.** USACERL Technical Report N-91/03, Jan 1991.

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Dharmavaram, S., D.A. Knowlton, C. Heflin, and B.A. Donahue. **Hazardous Waste Minimization Assessment: Fort Campbell, KY.** USACERL Technical Report N-91/09, Jan 1991.

Dharmavaram, S., D.A. Knowlton, and B.A. Donahue. **Hazardous Waste Minimization Assessment: Fort Meade, MD.** USACERL Technical Report N-91/14, Jan 1991.

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115. HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMID)

Category: II.g. Management Strategies

Purpose: To inform the Director of Engineering and Housing (DEH) officer at military installations of hazardous material (HM) brought onto an installation and that HM can be processed into hazardous waste (HW).

Application: This system can be used on all hazardous material entering a military installation that can be processed into hazardous waste.

Description: This system is used in conjunction with the Hazardous Waste Management Information System (HWMIS). The HMID system is a computer-based identification system. The minimum system requirements for running the HMID program are an IBM/XT or compatible system with 512K of free RAM, a 5 1/4" 360K floppy disk drive, a 10 MB hard disk, and DOS 3.2 or greater.

The Hazardous Materials Identification System (HMID) is a tool developed by the Construction Engineering Research Laboratories (CERL) to aid the Environmental Management Officer (EMO) in achieving the goals of the United States Army Hazardous Materials (HM) and Hazardous Waste (HW management programs, including:

- Complying with all Federal, Department of Defense (DOD), State, and Local regulations governing HM and HW.
- Protecting the health and well-being of its personnel, the general public, and the environment.
- Minimizing expenditures for HM and HW management.

More specifically, HMID is a system which allows the Environmental Management Officer (EMO) to account for HMs on an installation by processing and reporting data received from Logistics Control Activity (LCA) with minimal amount of additional data entered by the EIM.

As an aid to the EMO in HM management, HMID can be integrated into the Hazardous Waste Management Information System (HWMIS) to allow for the accounting of HM through the stages of its use: procurement, use, and disposal or recycling.

Advantages: This system for identification of hazardous materials is a simplification over paper method . The system is user friendly. A system for downloading from a mainframe using C or DBXL is in development.

Limitations: Downloading data from a mainframe computer to a PC is cumbersome. Older sets of data menus must be transferred by hand to new facilities because of the Base Closure Act.

Cost: Free to DOD installations.

Availability: Available from USACERL. Contact USATHAMA to obtain data.

Status: Limited trial implementation was conducted from 1990 to present at White Sands, NM. Approximately 75 installations are using this system.

References: **The Hazardous Materials Identification System (HMID).** USACERL, Champaign, IL, Jul 1991.

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116. HAZARDOUS WASTE MANAGEMENT INFORMATION SYSTEM

Category: II.g. Management Strategies

Purpose: The Hazardous Waste Management Information System (HWMIS) is a management tool developed to aid the environmental coordinator (EC) at an installation in the management of HW and minimization programs. Help in tracking HMs and HW from cradle to grave is the impetus behind HWMIS. The ease of formulating the upward reporting requirements to EPA, HQDA, and MACOMs is also an important function of HWMIS.

Application: This management system is applicable to all hazardous waste and hazardous materials.

Description: HWMIS is a user-friendly system created to aid an EC at an installation. There are many uses and benefits. One of the main benefits is to aid ECs in managing HW and HM on installations. With the impetus being minimization, ECs must know what HMs are used, what HWs are generated, what has been treated/processed, what has been stored for less than 90 days, and what HW has been disposed.

Environmental engineers from all levels of the Army have helped design HWMIS to meet the needs of an installation's environmental coordinator. HWMIS captures data at critical points of HM use, HW generation, treatment/process, interim storage, and disposal. HWMIS also provides employee training record keeping, spills record keeping (reportable and non reportable), permit/violation record keeping, system maintenance utilities, and the ability to send summaries to MACOM/DA level.

Through HWMIS, the standard unit of measures include gallons (GL), pounds (LB), and kilogram (KG), with kilograms the preferred unit of measure. HWMIS provides conversion from pounds to kilograms automatically. With the user inputing the appropriate density, gallons are also converted to kilograms. Using a standard unit of measure provides more accurate comparisons and more easily understood reports and summaries.

HWMIS is designed to provide the environmental coordinator with internal management reports based on the data entered. Some of the reports include who is producing HW, how much HW is treated/recycled, what quantity of HW is going off the installation, where is it going, and when it reached its destination. Other reports include who has had the proper training and who needs training. Internal management reports are a vital part of HWMIS and help ECs at an installation get a better picture of HW management. Also, quantities needed for external reports (e.g. Biennial and DESR) are provided to aid the EC in fulfilling regulatory requirements.

Advantages: This management system is faster than paper tracking. It allows near cradle to grave tracking of HW and HM and is user friendly.

Limitations: The computer language used is dBase III+ or DBXL. It is limited to the storage space on the computer used.

Cost: Free to DOD installations.

Availability: This is a full running program at USACERL. The system using C language program will be available by December 1992.

Status: Limited trial implementation has been conducted at White Sands Missile Range, NM, since 1990.

References: Webster, R., L. Mikulich, and C. Corbin. **Hazardous Waste Management Information System (HWMIS) User Manual**. USACERL, Champaign, IL, Draft Feb 1989.

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117. HAZARDOUS MATERIAL AND HAZARDOUS WASTE BAR CODE TRACKING SYSTEM

Category: II.g. Management Strategies

Purpose: To track hazardous-material consumption, hazardous waste generation, hazardous-waste storage, and hazardous-waste disposal on Army installations.

Application: This hazardous waste-tracking system is applicable to all hazardous materials and waste generated from these materials, that can be placed in containers, from the point of delivery and storage on the installation to the time that the material as a hazardous waste is removed from the military installation.

Description: The HM/HW tracking system uses dBase IV on an IBM PC or compatible personal computer and a programmable bar code reader to monitor the location and ownership of HM/HW containers. The personal computer must have 640 K RAM and a hard disk drive. The bar code reader is the point of transaction data collection device and the temporary storage location for tracking information. The personal computer is used for permanent storage of tracking data, HM/HW forms editing, and HM/HW tracking report generation.

The Hazardous Material and Hazardous Waste (HM/HW) tracking system has the following characteristics:

1. Documents the chain-of-custody (or life history) of HMs from the point of issue at warehouse to point of use, and HWs from the point of generation to final disposition.
2. Maintains data on relevant physical and chemical characteristics including chemical names and quantity of HM/HW involved.
3. Employs automated identification technologies to minimize cost, staff time, and paperwork necessary to implement the system.
4. Provides a database that is flexible, easy to use, large in capacity and capable of producing reports of different contents and formats.
5. Compatible with existing HM/HW management procedures at Army installations.

Advantages: There is greater accuracy of the chain-of-custody with documentation. There is less human error. The system has easy access to data for reporting purposes and saves time in reporting.

Limitations: Users need to be trained. At the present time this system can not be used on liquid waste streams. Also, at the present time it is not set up for hazardous materials.

Cost: Costs incurred in setting up this system include the cost of a bar code scanner and a PC computer. Contingent upon the type of computer and scanner purchased for the system.

Availability: Commercially available.

Status: The bar code tracking system has been demonstrated at the Army Depot in Corpus Christi, TX. Full-scale implementation during 1992 will be at Ft. Lewis, WA.

References: **Hazardous Material and Hazardous Waste Bar Code Tracking System.** Fact Sheet, EN 42, U.S. Army Corps of Engineers Construction Engineering Research Laboratories, Champaign, IL, May 1990.

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118. ECONOMIC ANALYSIS MODEL FOR HAZARDOUS WASTE MINIMIZATION CAPITAL INVESTMENT

Category: II.g. Management Strategies

Purpose: Economic analysis decision making.

Application: The model is for use with hazardous waste generated from: paint and paint waste, waste solvents, batteries and battery acid, industrial waste treatment sludges, electroplating waste, lubricating oil, and generic waste.

Description: A computer program in C language has been developed for use by the Department of Defense (DOD) for economic evaluation of hazardous waste remediation. The program is classified and not for civilian use but could be adapted for civilian use with permission of the DOD and U. S. Army Corps of Engineers.

Advantages: Very fast information available without research. The generic model is applicable for either DOD or civilian uses.

Limitations: DOD applicable only in present form.

Cost: A computer disc, instruction manual, and labor.

Availability: Available to U.S. Government agencies or to civilians.

Status: The model has been field tested at 25 DOD installations.

References: None available.

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119. LIFE-CYCLE COST ANALYSIS FOR SOLVENT MANAGEMENT OPTIONS

Category: II.g. Management Strategies

Purpose: To identify the most economical means of eliminating solvents under the used solvent elimination (USE) program.

Application: The method is applicable for the calculation of life cycle costs for four recycle options: (1) recycling on-post, (2) recycling with a commercial recycler, (3) recycling with a full service contractor, or (4) recycling by burning in an industrial boiler. Solvents for which the method is applicable include chlorinated and petroleum distillate solvents.

Description: Life cycle cost (LCC) calculations for solvent management consist of six steps: (1) determine the cost of new solvent to be purchased each year, (2) determine the cost of capital equipment or investment for each year, (3) determine recurring costs for each year, (4) calculate cost-reduction factors such as heating and salvage values, (5) calculate the present value for each year by multiplying the total annual costs by the present value factors for each year, and (6) add the annual present value factors for the lifetime of the project to arrive at the LCC.

Advantages: Enables the user to identify the most economical means of eliminating solvents under the USE program.

Limitations: The method is limited to the options covered and the applicable solvents.

Costs: This management options will save money in design and management of solvent streams..

Availability: The method is available in Technical Note 86-1 cited below. Technical assistance is available from the Construction Engineering Research Laboratories (CERL).

Status: The program has been implemented. Two facilities that use the program are Rock Island Arsenal, IL and Ft. Bragg, NC.

References:
Life Cycle Cost Analysis for Solvent Management Options, Fact Sheet, U.S. Army Corps of Engineers CERL, Apr 1987.

Watling, E.T., **Economic Analysis of Solvent Management Options**, Department of the Army, Office of the Chief of Engineers, DAEN-ZCF-U Technical Note No. 86-1, May 1986.

Neathammer, R.D., **Economic Analysis Description and Methods**. U.S. Army CERL Technical Report P-151/ADA135280, 1983.

Contact:
Bernie Donahue
U.S. Army Corps of Engineers
Construction Engineering Research Laboratories
P.O. Box 9005
Champaign, IL 61826-9005
217-352-6511, 800-USA-CERL

60

DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORY, CORPS OF ENGINEERS
P.O. BOX 4005
CHAMPAIGN, ILLINOIS 61820-1305

REPLY TO
ATTENTION OF:

CECER-RMO (37-2-10hh)

19 Jan 89

MEMORANDUM FOR: COMMANDER, US ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY, ATTN: AMXTH-RM, ABERDEEN PROVING GROUND, MD 21010-5401

SUBJECT: Final Cost Reimbursable Services (UA8)

1. Reference DA Form 2544, Order No. IAR7788 dated 08/03/88.

2. Work authorized by above reference has been reviewed and fund status is as follows:

a.	Amount Authorized:	$200,000.00
b.	Final Cost:	$199,897.17
c.	Excess Funds:	$ 102.83

3. Excess funds are hereby returned. Our financial records have been adjusted accordingly. Request your unliquidated obligation be decreased by this amount also. No further action is required. This letter is being used as Change No. 2 to referenced reimbursable order. If you desire to issue a confirmatory change order, it also should be issued as Change No. 2. Questions regarding this issue should be addressed to Don LaJoie at (217)373-7212.

FOR THE COMMANDER AND DIRECTOR:

DONALD J. LAJOIE
Staff Accountant

DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORY, CORPS OF ENGINEERS
P.O. BOX 4005
CHAMPAIGN, ILLINOIS 61824-4005

REPLY TO
ATTENTION OF

CECER-RM (37)

22 Jan 9

MEMORANDUM FOR Commander, US Army Toxic and Hazardous Materials Agency, ATTN: AMXTH-RM, Aberdeen Proving Ground, MD 21010-5401

SUBJECT: Final Cost Reimbursable Services (UA8)

1. Reference DD Form 2544, Order No. IAR7788, dated 3 August 8

2. Work authorized by above reference has been reviewed and fu status is as follows:

a. Amount Authorized: $ 199,897.17

b. Final Cost: $ 197,107.30

c. Excess Funds: $ 2,789.87

3. Excess funds are hereby returned. Our financial records ha been adjusted accordingly. Request your unliquidated obligatio be decreased by this amount also. No further action is require This letter is being used as Change No. 3 to referenced reimbursable order. If you desire to issue a confirmatory chan order, it also should be issued as Change No. 3.

4. Questions regarding this issue should be addressed to Maril Burke who can be reached at 217/373-7208.

FOR THE COMMANDER AND DIRECTOR:

DONALD J. LAJOIE
Acting Resource Management
Officer

78270860 50 CHAN

Excellence • Professionalism • Integrity

DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORY, CORPS OF ENGINEERS
P.O. BOX 4005
CHAMPAIGN, ILLINOIS 61824-4005

REPLY TO
ATTENTION OF:

CECER-RMB (37-2-10hh)

08 Mar 1990

MEMORANDUM FOR COMMANDER, U.S. ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY, ATTN: AMXTH-RM, ABERDEEN PROVING GROUND, MD 21010-5401

SUBJECT: Final Cost Reimbursable Services (UA8)

1. Reference DA Form 2544, Order No. IAR7788, dated 03 Aug 1988.

2. Work authorized by above reference has been reviewed and fund status is as follows:

a.	Amount Authorized:	$ 197,107.30
b.	Final Cost:	$ 196,909.77
c.	Excess Funds:	$ 197.53

3. Excess funds are hereby returned. Our financial records have been adjusted accordingly. Request your unliquidated obligation be decreased by this amount also. No further action is required. This letter is being used as Change No. 4 to referenced reimbursable order. If you desire to issue a confirmatory change order, it also should be issued as Change No. 4.

4. Questions may be referred to Marilyn Burke at (217) 373-7208.

FOR THE COMMANDER:

DONALD J. LAJOIE
Acting Resource Management
Officer

DEOB

18278860 58 0HXW 789000 4446 IAR 7788

IAR7788, 5 AUG 88

FUNDING AUTHORIZATION/CHANGE ACTION (USATHAMA Reg 5-1)		Date 2 August 88
TO: Chief, Resource Management Div	FROM: CIRD	
1. Project Number & Title HXW HAZMIN (USACE Support)		2. Perf Installation CERL

3. Appropriation FY 88

✓ OMA .14
PAA
RDTE

1 Qtr
2 Qtr
3 Qtr
4 Qtr

4. Annual Funding Program Summary

AFP	Inc/(Dec)	Rev
$ 0	$ ~~200~~ K 160	$ ~~200~~ K 160

5. Scope of Work (Description by Task and Dollars)

	AFP	Curr Amt	Inc/(Dec)	Cum
Provision of ~~IPA~~'s Environmental Executives Support	$ ~~200~~ K 160	$ 0	$ ~~200~~ K 160	$ ~~200~~ 160 TA

This effort is to provide IPA's, for environmental executives support to Hdqrs DA Environmental ~~Sup~~ Office: Project is by direction of Tom Delaney DA Env. office, 7/28/88.

AFP & Cash from .11 Program Planning

6. Task Completion Dates: 30 Sep 88

~~[illegible]~~ — Service Order per Danny (All contractual) — 5 AUG 88

Tech POC:
Bob Riggins
~~Bernie Donahue~~ - 800-USA-CERL ~~ext 333~~

Financial POC:
Don Lajoie
~~Michelle Cooper~~ 7212
(217)-373-~~7208~~

The 160K is for contracting with the Universities to obtain the support only. Nothing for distribution cost required at this time.

CDr. US Army CERL
ATTN: CECER-RM (~~Michelle Cooper~~)
P.O. Box 4005
Champaign, IL 61820-1305

7. Scientific & Technical Information Prog Applies: ___ Yes ___ No	Information/Study Release Approval: ___ Yes ___ No
8. Recommendation - Project Officer [signature]	Concurrence - Cost Est - Analysis [signature]
9. Approval - Division Chief [signature]	Threshold Approval Required: ___ Yes ✓ No — 8/2 PROGRAM/BUDGET
10. Threshold Approval - Commander	

THAMA Form 9, 1 Aug 79, Replaces CDIR Form 9, 12 Mar 79 edition which is obsolete.

FILE

...RA- ARMY ORDER FOR ...IMBURSABLE SERVICES

For use of this form, see AR 37-108 and AR 37-110: the proponent agency is USAFAC.

1 RECEIVING OFFICE CONTROL NUMBER: UA8

☐ FUNDED ☒ AUTOMATIC

2 ORDER — a NUMBER: IAR7788 — b DATE: 3 Aug 88

3 CHANGE ORDER — a NUMBER: BASIC — b DATE:

4. TO BE PERFORMED BY *(Command, Installation or Activity)*, ADDRESS *(Include ZIP Code)*, AND AUTOVON NUMBER

Commander, U.S. Army CERL
ATTN: CECER-RM (Shelly McConahan)
P.O. Box 4005
Champaign, IL 61820

5. ORDERED BY *(Command, Installation or Activity)*, ADDRESS *(Include ZIP Code)*, AND AUTOVON NUMBER

Commander, U.S. Army Toxic and Hazardous Materials Agency, ATTN: AMXTH-RM
Aberdeen Proving Ground, MD 21010-5401
AUTOVON 584-4332

6 DESCRIPTION OF SERVICES TO BE PERFORMED

FY88 funding provided for Project HXW USACE Support of Hazardous Waste Minimization (HAZMIN) Program to provide for Intra-Government Personnel Act (IPA) for environmental support to Headquarters, Department of the Army Environmental Office.

Expiration date for obligation of this order is on or before 30 Sep 88.

USATHAMA Financial POC: Chris Sparks, AMXTH-RM, AUTOVON 584-4332/4331 or commercial, (301) 676-8087.
CERL Financial POC: Shelly McConahan (217) 373-7208.
CERL Principal Investigator: Bob Riggins (800) 373-2375.
CERL Procurement POC: Don Lajoie, (217) 373-7212

Request two signed accepted copies be returned to address in Block 5.

Process disbursement vouchers (SF 1080) monthly through the TFO System. Forward to the Cdr, USAAPGSA, ATTN: STEAP-RM-FG-P, Aberdeen Proving Ground, MD 21005-5001. Indicate on the SF 1080 the order number, accounting classification and expenditure order data.

ACCEPTANCE COPY TO APG DATE: 19 AUG 1988

7a NAME AND TITLE OF ORDERING OFFICER: H. R. FEINBERG, C, RESR MGT DIV — b. SIGNATURE: [signature] — c DATE: 8/5/88

ORIGINATING FINANCE AND ACCOUNTING OFFICE APPROVAL

8a. ACCOUNTING CLASSIFICATION: 2182020 6A-7319 P788008.14 2572
IAR7788/7827886058 S18001 OHXW EOC444 CC789000

b AMOUNT: $160,000.00

c. CHANGE

INCREASE AMOUNT ______ DECREASE AMOUNT ______ REVISED AMOUNT ______

9 Services to be performed pursuant to this order are properly chargeable to the appropriations or other accounts indicated above until 30 Sep 88 the expiration date of this order.

10a TYPED NAME AND TITLE OF APPROVING OFFICER: FOR: S. GAST, Finance & Accounting Officer — b. SIGNATURE: Margaret Taylor — c DATE: 8/5/88

ACCEPTING OFFICER

11 THE ABOVE TERMS AND CONDITIONS ARE SATISFACTORY AND ARE ACCEPTED

a TYPED NAME AND TITLE OF ACCEPTING OFFICER: Carl Camp, Systems Accountant — b SIGNATURE: Carl Camp — c DATE: 8/12/88

DA FORM 2544 — EDITION OF 1 DEC 75 WILL BE USED UNTIL EXHAUSTED.

Ref IAR 7788 [initials] 12 Sep 88

FUNDING AUTHORIZATION/CHANGE ACTION (USATHAMA Reg 5-1)	Date 9/12/88
TO: Chief, Resource Management Div	FROM: C, IRD
1. Project Number & Title: HXW HAZMIN (HDQRS DA)	2. Perf Installation: CERL

3. Appropriation FY 88

✓	OMA .14	1 Qtr	
	PAA	2 Qtr	
	RDTE	3 Qtr	
		4 Qtr	✓

4. Annual Funding Program Summary

AFP $	Inc/(Dec) $	Rev $
160K	40K	200K

5. Scope of Work (Description by Task and Dollars)

	AFP $	Curr Amt $	Inc/(Dec) $	Cum $
Provision of Environmental Executive Support	160K	160 K	40 K	~~160K~~ 200K [initials]

This funding to provide total requirements per telephone conversation ~~[illegible]~~ between Mr A Kers THAMA and Mr Riggins CERL. There was a misunderstanding at CERL concerning requirements.

6. Task Completion Dates:

POC's & Addresses are unchanged

7. Scientific & Technical Information Prog Applies: ___ Yes ___ No	Information/Study Release Approval: ___ Yes ___ No
8. Recommendation - Project Officer: [signature]	Concurrence - Cost Est - Analysis: [signature]
9. Approval - Division Chief: [signature]	Threshold Approval Required ___ Yes ✓ No [initials] 9/12 PROGRAM/BUDGET
10. Threshold Approval - Commander	

THAMA Form 9, 1 Aug 79, Replaces CDIR Form 9, 12 Mar 79 edition which is obsolete.

FILE

INTRA-ARMY ORDER FOR REIMBURSABLE SERVICES

For use of this form, see AR 37-108 and AR 37-110: the proponent agency is USAFAC.

1 RECEIVING OFFICE CONTROL NUMBER
#UA8

☐ FUNDED ☒ AUTOMATIC

2 ORDER
a NUMBER IAR7788
b DATE 3 Aug 88

3 CHANGE ORDER
a NUMBER 1
b DATE 12 Sep 88

4. TO BE PERFORMED BY (Command, Installation or Activity), ADDRESS (Include ZIP Code), AND AUTOVON NUMBER

Commander, U.S. Army CERL
ATTN: CECER-RM (Shelly McConahan)
P.O. Box 4005
Champaign, IL 61820

5. ORDERED BY (Command, Installation or Activity), ADDRESS (Include ZIP Code), AND AUTOVON NUMBER

Commander, U.S. Army Toxic and Hazardous Materials Agency, ATTN: AMXTH-RM
Aberdeen Proving Ground, MD 21010-5401
AUTOVON 584-4332

6. DESCRIPTION OF SERVICES TO BE PERFORMED

Increase to FY88 funding provided for Project HXW USACE Support of Hazardous Waste Minimization (HAZMIN) Program to provide for Intra-Government Personnel Act (IPA) for environmental support to Headquarters, Department of the Army Environmental Office.

Expiration date for obligation of this order is on or before 30 Sep 88.

USATHAMA Financial POC: Margaret Taylor, AMXTH-RM, AUTOVON 584-4332/4331 or commercial, (301) 676-8087.
CERL Financial POC: Shelly McConahan (217) 373-7208.
CERL Principal Investigator: Bob Riggins (800) 373-2375.
CERL Procurement POC: Don Lajoie, (217) 373-7212

Request acceptance copy be datafaxed to USATHAMA, AUTOVON 584-2008, and two signed accepted copies be returned to address in Block 5.

Process disbursement vouchers (SF 1080) monthly through the TFO System. Forward to the Cdr, USAAPGSA, ATTN: STEAP-RM-FG-P, Aberdeen Proving Ground, MD 21005-5001. Indicate on the SF 1080 the order number, accounting classification and expenditure order data.

ACCEPT...
TO A...
DATE: 19 SEP 1988

7a NAME AND TITLE OF ORDERING OFFICER
H. R. FEINBERG
C, RESR MGT DIV

b. SIGNATURE

c DATE 13 Sep 88

ORIGINATING FINANCE AND ACCOUNTING OFFICE APPROVAL

8a. ACCOUNTING CLASSIFICATION
~~2182020 6A-7319 P788008.14 2572~~
IAR7788/7827886058 S18001 OHXW EOC444 CC789000

b AMOUNT $160,000.00

c CHANGE
INCREASE AMOUNT $40,000.00 DECREASE AMOUNT ______ REVISED AMOUNT $200,000.00

9 Services to be performed pursuant to this order are properly chargeable to the appropriations or other accounts indicated above until 30 Sep 88 (Day - Month - Year) the expiration date of this order.

10a TYPED NAME AND TITLE OF APPROVING OFFICER
FOR: S. GAST
Finance & Accounting Officer

b. SIGNATURE Margaret C Taylor

c DATE 9/13/88

ACCEPTING OFFICER

11 THE ABOVE TERMS AND CONDITIONS ARE SATISFACTORY AND ARE ACCEPTED

a. TYPED NAME AND TITLE OF ACCEPTING OFFICER
LINDA R. WRIGHT
Resource Management Officer

b. SIGNATURE Linda R. Wright

c DATE ACCEPTED 9/14/88

DA FORM 1 JUN 77 2544 EDITION OF 1 DEC 75 WILL BE USED UNTIL EXHAUSTED

U.S. GPO

6 FILE

MILITARY INTERDEPARTMENTAL PURCHASE REQUEST

1. PAGE 1 OF 2 PAGES

2. FSC	3. CONTROL SYMBOL NO.	4. DATE PREPARED	5. MIPR NUMBER	6. AMEND NO.
	Z41	11 Apr 91	MIPR3011	ORIG

7. TO:
Commander & Director
USA Construction Engr Resch Lab
ATTN: CECEL-RM (M. Burke), P.O. Box 4005
Champaign, IL 61824-4005

8. FROM: *(Agency, name, telephone number of originator)*
Commander, U.S. Army Toxic and Hazardous Materials Agency, ATTN: CETHA-RM-B
Aberdeen Proving Ground, MD 21010-5401
DSN 584-4332, Commercial 301-676-8087

9. ITEMS ☐ ARE ☐ ARE NOT INCLUDED IN THE INTERSERVICE SUPPLY SUPPORT PROGRAM AND REQUIRED INTERSERVICE SCREENING ☐ HAS ☐ HAS NOT BEEN ACCOMPLISHED.

ITEM NO. a	DESCRIPTION (Federal stock number, nomenclature, specification and/or drawing No., etc.) b	QTY. c	UNIT d	ESTIMATED UNIT PRICE e	ESTIMATED TOTAL PRICE f
1	FY91 funds in support of Project HXZ Corps of Engineers support. Funds to convert present program to a format compatible with AAEMIS.			ORIG	$311,000.00
2	Expiration date for obligation of this order is 30 Sep 91 for the ordering Agency with period of performance 15 Apr 91 - 15 Mar 92.				
3	USATHAMA Financial POC Carla Zealor, CETHA-RM-B, DSN 584-4332/4331 or commercially at 301-676-8087.				
4	Fin POC: Marilyn Burke, CECEL-RM, 217-373-7208; FAX 217-373-7222. Tech POC: Lynn Mikulich, CERL, 217-373-6733.				
5	Request two signed copies of the enclosed acceptance document (DD Form 448-2) be forwarded to address in block 8.				
6	This order is placed in accordance with the provisions of 41USC23 and DODI 7220.1.			ACCEPTANCE COPY	
7	Process disbursement vouchers (SF 1080) monthly through the TFO System. Forward to the Cdr, USAAPGSA, ATTN: STEAP-RM-FG-P, Aberdeen Proving Ground, MD 21005-5001. Indicate on the SF 1080 the order number, accounting classification and expenditure order data.				

10. SEE ATTACHED PAGES FOR DELIVERY SCHEDULES, PRESERVATION AND PACKAGING INSTRUCTIONS, SHIPPING INSTRUCTIONS AND INSTRUCTIONS FOR DISTRIBUTION OF CONTRACTS AND RELATED DOCUMENTS.

11. GRAND TOTAL $311,000.00

12. TRANSPORTATION ALLOTMENT *(Used if FOB Contractor's plant)*

13. MAIL INVOICES TO *(Payment will be made by)*
Cdr, USAAPGSA, ATTN: STEAP-RM-FP-V
APG, MD 21005-5001
PAY OFFICE DODAAD

14. FUNDS FOR PROCUREMENT ARE PROPERLY CHARGEABLE TO THE ALLOTMENTS SET FORTH BELOW, THE AVAILABLE BALANCES OF WHICH ARE SUFFICIENT TO COVER THE ESTIMATED TOTAL PRICE.

ACRN	APPROPRIATION	LIMIT/SUBHEAD	SUPPLEMENTAL ACCOUNTING CLASSIFICATION	ACCTG STA DODAAD	AMOUNT
	2112020		08-8160 P788008.14 2572 MIPR30117827816058 OHXZ CC789000 EOC444	S18001	$311,000.00

15. AUTHORIZING OFFICER *(Type name and title)*
H. R. FEINBERG, C, Resr Mgt Div

16. SIGNATURE

17. DATE 4/11/91

DD FORM 448 PREVIOUS EDITION IS OBSOLETE.

MILITARY INTERDEPARTMENTAL PURCHASE REQUEST

1. PAGE 1 OF 21 PAGES

2. FSC	3. CONTROL SYMBOL NO.	4. DATE PREPARED	5. MIPR NUMBER	6. AMEND NO.
		11 Apr 91	MIPR3011	ORIG

7. TO:
Commander & Director
USA Construction Engr Resch Lab
ATTN: CECEL-RM (M. Burke), P.O. Box 4005
Champaign, IL 61824-4005

8. FROM: *(Agency, name, telephone number of originator)*
Commander, U.S. Army Toxic and Hazardous Materials Agency, ATTN: CETHA-RM-B
Aberdeen Proving Ground, MD 21010-5401
DSN 584-4332, Commercial 301-676-8087

9. ITEMS ☐ ARE ☐ ARE NOT INCLUDED IN THE INTERSERVICE SUPPLY SUPPORT PROGRAM AND REQUIRED INTERSERVICE SCREENING ☐ HAS ☐ HAS NOT BEEN ACCOMPLISHED.

ITEM NO. a	DESCRIPTION (Federal stock number, nomenclature, specification and/or drawing No., etc.) b	QTY. c	UNIT d	ESTIMATED UNIT PRICE e	ESTIMATED TOTAL PRICE f
8	Certified as to availability of funds not to exceed $311,000.00 under the appropriation cited in Block 14 by: Carla J. Zealor 4/11/91 FOR: S. GAST Finance & Accounting Officer				

10. SEE ATTACHED PAGES FOR DELIVERY SCHEDULES, PRESERVATION AND PACKAGING INSTRUCTIONS, SHIPPING INSTRUCTIONS AND INSTRUCTIONS FOR DISTRIBUTION OF CONTRACTS AND RELATED DOCUMENTS.

11. GRAND TOTAL

12. TRANSPORTATION ALLOTMENT *(Used if FOB Contractor's plant)*

13. MAIL INVOICES TO *(Payment will be made by)*

PAY OFFICE DODAAD

14. FUNDS FOR PROCUREMENT ARE PROPERLY CHARGEABLE TO THE ALLOTMENTS SET FORTH BELOW, THE AVAILABLE BALANCES OF WHICH ARE SUFFICIENT TO COVER THE ESTIMATED TOTAL PRICE.

ACRN	APPROPRIATION	LIMIT/SUBHEAD	SUPPLEMENTAL ACCOUNTING CLASSIFICATION	ACCTG STA DODAAD	AMOUNT

15. AUTHORIZING OFFICER *(Type name and title)*

16. SIGNATURE

17. DATE

DD FORM 1 JUN 72 448

FILE

ACCEPTANCE OF MIPR Z41

1. TO (Requiring Activity Address) (Include ZIP Code)	2. MIPR NUMBER	3. AMENDMENT NO
COMMANDER, U.S. ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY, ATTN: CETHA-RM-B ABERDEEN PROVING GROUND, MD 21010-5401	MIPR3011	ORIG
	4. DATE (MIPR Signature Date) 11 Apr 91	5. AMOUNT (As Listed in the MIPR) $ 311,000.00

6. The MIPR identified above is accepted and the items requested will be provided as follows: (Check as Applicable)

a. [X] ALL ITEMS WILL BE PROVIDED THROUGH REIMBURSEMENT (Category I)

b. [ ] ALL ITEMS WILL BE PROCURED BY THE DIRECT CITATION OF FUNDS (Category II)

c. [ ] ITEMS WILL BE PROVIDED BY BOTH CATEGORY I AND CATEGORY II AS INDICATED BELOW

d. [ ] THIS ACCEPTANCE, FOR CATEGORY I ITEMS, IS QUALIFIED BECAUSE OF ANTICIPATED CONTINGENCIES AS TO FINAL PRICE. CHANGES IN THIS ACCEPTANCE FIGURE WILL BE FURNISHED PERIODICALLY UPON DETERMINATION OF DEFINITIZED PRICES, BUT PRIOR TO SUBMISSION OF BILLINGS

7. [ ] MIPR ITEM NUMBER(S) IDENTIFIED IN BLOCK 13, "REMARKS" IS NOT ACCEPTED (IS REJECTED) FOR THE REASONS INDICATED

8. TO BE PROVIDED THROUGH REIMBURSEMENT CATEGORY I			9. TO BE PROCURED BY DIRECT CITATION OF FUNDS CATEGORY II		
ITEM NO. a	QUANTITY b	ESTIMATED PRICE c	ITEM NO. a	QUANTITY b	ESTIMATED PRICE c
	ORIG	$ 311,000.00			
d. TOTAL ESTIMATED PRICE		$ 311,000.00	d. TOTAL ESTIMATED PRICE		

ACCEPTANCE COPY

10. ANTICIPATED DATE OF OBLIGATION FOR CATEGORY II ITEMS

11. GRAND TOTAL ESTIMATED PRICE OF ALL ITEMS $ 311,000.00

12. FUNDS DATA (Check if Applicable)

a. [ ] ADDITIONAL FUNDS IN THE AMOUNT OF $ ______ ARE REQUIRED (See Justification in Block 13)

b. [ ] FUNDS IN THE AMOUNT OF $ ______ ARE NOT REQUIRED AND MAY BE WITHDRAWN

13. REMARKS

USACERL Financial POC is Ms. Rene Knop, CECER-RM-B, (217) 373-6797.

14. ACCEPTING ACTIVITY (Complete Address)
COMMANDER AND DIRECTOR, USACERL
ATTN: CECER-RM-B, PO BOX 4005,
CHAMPAIGN, IL 61824-4005

15. TYPED NAME AND TITLE OF AUTHORIZED OFFICIAL
for MARILYN J. BURKE, Budget Analyst

16. SIGNATURE Rene Knop

17. DATE 19 Apr 91

DD Form 448-2, JUL 71 PREVIOUS EDITION WILL BE USED UNTIL EXHAUSTED

MIPR 3011
JCS 18 APR 91

FUNDING AUTHORIZATION/ CHANGE ACTION (USATHAMA) DATE 08/04/91

TO: Chief, Resource Management Division FROM: C, ECD

Project Number: HXZ
Title: CORPS OF ENGINEERS SUPPORT
Major Command: CE

Appropriation: 2112020
AMSCODE: ~~722856-00-~~

Fiscal Year: 1991
Quarter: 3

Sequence No.: 1-91

Annual Funding Program Summary

	THAMA	COE
Current AFP:	$.00	$.00
Inc/Dec:	$311,000.00	$0.00
Revised AFP:	$311,000.00	$0.00
Total Combined AFP.........		$311,000.00

Description/Performer/Funding Detail

Funds Issue

Task	Description	Performer/ Installation	Funding Doc#	Task AFP	Prior Amount	Inc/Dec	Updated Amount
01.00.000	THAMA TBD			$0.00	$.00	$.00	$.00
03.37.001	HWMIS	CERL	MIPR 3011	$311,000.00	$0.00	$311,000.00	$311,000.00
06.00.000	COE TBD			$0.00	$.00	$.00	$.00
			TOTALS=	$311,000.00	$0.00	$311,000.00	$311,000.00

Recommendation - Project Officer ✓ Michael A. Dette	Concurrence -Cost Est- Resource Anal Claudette Dixon
Approval - Division Chief ✓ David C. Gryleuich	Threshold Approval Required __Yes ✓ No DA PROGRAM/BUDGET
Threshold Approval - Commander	Date Executed - RMD

THAMA Form 9, 01 Oct 89, Replaces 01 Oct 88 edition which is obsolete.

Project: HXZ- CORPS OF ENGINEERS SUPPORT Sequence #: 1-91

ADMINISTRATIVE DATA

Task: 03.37.001	Technical POC	Procurement POC	Financial POC
Funding Doc#: MIPR	LYNN MIKULICH		CDR/DIR,CERL
Obligation Date: / /	CERL		CECEL-RM/M. BURKE
Date SOW to Proc: / /			PO BOX 4005
Est Award Date: / /	,	,	CHAMPAIGN, IL 61824
Completion Date: / /	217-373-6733	- -	217-373-7208
			Datafax: 217-373-7222

Contract No:

Company Name:

Comments:

FY91 FUNDS TO CONVERT PRESENT HWMIS PROGRAM TO A FORMAT COMPATIBLE WITH AAEMIS.

Project Order: Period of performance - 15 Apr 91 - 15 Mar 92.

MILITARY INTERDEPARTMENTAL PURCHASE REQUEST

1. PAGE 1 OF 2 PAGES

2. FSC	3. CONTROL SYMBOL NO	4. DATE PREPARED	5. MIPR NUMBER	6. AMEND NO.
	741	30 Sep 91	MIPR3011	1

7. TO:
Commander & Director
USA Construction Engr Resch Lab
ATTN: CECEL-RM (M. Burke), P.O. Box 4005
Champaign, IL 61824-4005

8. FROM: *(Agency, name, telephone number of originator)*
Commander, U.S. Army Toxic and Hazardous Materials Agency, ATTN: CETHA-RM-B
Aberdeen Proving Ground, MD 21010-5401
DSN 584-4332, Commercial 301-676-8087

9. ITEMS ☐ ARE ☐ ARE NOT INCLUDED IN THE INTERSERVICE SUPPLY SUPPORT PROGRAM AND REQUIRED INTERSERVICE SCREENING ☐ HAS ☐ HAS NOT BEEN ACCOMPLISHED

ITEM NO. a	DESCRIPTION *(Federal stock number, nomenclature, specification and/or drawing No., etc.)* b	QTY c	UNIT d	ESTIMATED UNIT PRICE e	ESTIMATED TOTAL PRICE f
1	FY91 funds in support of Project HXZ Corps of Engineers support. Funds to convert present program to a format compatible with AAEMIS.			ORIG AMEND 1	$311,000.00 200,000.00
2	Expiration date for obligation of this order is 30 Sep 91 for the ordering Agency with period of performance 15 Apr 91 - 15 Mar 92.				
3	USATHAMA Financial POC Carla Zealor, CETHA-RM-B, DSN 584-4332/4331 or commercially at 301-676-8087.				
4	Fin POC: Marilyn Burke, CECEL-RM, 217-373-7208; FAX 217-373-7222. Tech POC: Lynn Mikulich, CERL, 217-373-6733.				
5	Request two signed copies of the enclosed acceptance document (DD Form 448-2) be forwarded to address in block 8.				
6	This order is placed in accordance with the provisions of 41USC23 and DODI 7220.1.				
7	[illegible]cess disbursement vouchers (SF 1080) monthly [illegible]ough the TFO System. Forward to the Cdr, USAAPGSA, ATTN: STEAP-RM-FG-P, Aberdeen Proving Ground, MD 21005-5001. Indicate on the SF 1080 the order number, accounting classification and expenditure order data.				

10. SEE ATTACHED PAGES FOR DELIVERY SCHEDULES, PRESERVATION AND PACKAGING INSTRUCTIONS, SHIPPING INSTRUCTIONS AND INSTRUCTIONS FOR DISTRIBUTION OF CONTRACTS AND RELATED DOCUMENTS

11. GRAND TOTAL $511,000.00

12. TRANSPORTATION ALLOTMENT *(Used if FOB Contractor's plant)*

13. MAIL INVOICES TO *(Payment will be made by)*
Cdr, USAAPGSA, ATTN: STEAP-RM-FP-V
APG, MD 21005-5001
PAY OFFICE DODAAD

14. FUNDS FOR PROCUREMENT ARE PROPERLY CHARGEABLE TO THE ALLOTMENTS SET FORTH BELOW, THE AVAILABLE BALANCES OF WHICH ARE SUFFICIENT TO COVER THE ESTIMATED TOTAL PRICE.

ACRN	APPROPRIATION	LIMIT/SUBHEAD	SUPPLEMENTAL ACCOUNTING CLASSIFICATION	ACCTG STA DODAAD	AMOUNT
	2112020		08-8160 P788008.14 2572 MIPR3011/S27816058 OHXZ CC789000 EOC444	S18001	$511,000.00

15. AUTHORIZING OFFICER *(Type name and title)*
R. R. FEINBERG, C, Resr Mgt Div

16. SIGNATURE

17. DATE 9/30/91

DD FORM 1 JUN 72 448 PREVIOUS EDITION IS OBSOLETE

MILITARY INTERDEPARTMENTAL PURCHASE REQUEST

1. PAGE 1 OF 2 PAGES

2. FSC	3. CONTROL SYMBOL NO.	4. DATE PREPARED	5. MIPR NUMBER	6. AMEND NO
		30 Sep 91	MIPR3011	1

7. TO

Commander & Director
USA Construction Engr Resch Lab
ATTN: CECEL-RM (M. Burke), P.O. Box 4005
Champaign, IL 61824-4005

8. FROM: (Agency, name, telephone number of originator)

Commander, U.S. Army Toxic and Hazardous
Materials Agency, ATTN: CETHA-RM-B
Aberdeen Proving Ground, MD 21010-5401
DSN 584-4332, Commercial 301-676-8087

9. ITEMS [ ] ARE [ ] ARE NOT INCLUDED IN THE INTERSERVICE SUPPLY SUPPORT PROGRAM AND REQUIRED INTERSERVICE SCREENING [ ] HAS [ ] HAS NOT BEEN ACCOMPLISHED

ITEM NO a	DESCRIPTION (Federal stock number, nomenclature, specification and/or drawing No., etc.) b	QTY c	UNIT d	ESTIMATED UNIT PRICE e	ESTIMATED TOTAL PRICE f
8	Certified as to availability of funds not to exceed $511,000.00 under the appropriation cited in Block 14 by:				
	Margaret C Taylor 9/30/91 FOR: S. GAST Finance & Accounting Officer				

10. SEE ATTACHED PAGES FOR DELIVERY SCHEDULES, PRESERVATION AND PACKAGING INSTRUCTIONS, SHIPPING INSTRUCTIONS AND INSTRUCTIONS FOR DISTRIBUTION OF CONTRACTS AND RELATED DOCUMENTS.

11. GRAND TOTAL

12. TRANSPORTATION ALLOTMENT (Used if FOB Contractor's plant)

13. MAIL INVOICES TO (Payment will be made by)

PAY OFFICE DODAAD

14. FUNDS FOR PROCUREMENT ARE PROPERLY CHARGEABLE TO THE ALLOTMENTS SET FORTH BELOW, THE AVAILABLE BALANCES OF WHICH ARE SUFFICIENT TO COVER THE ESTIMATED TOTAL PRICE.

ACRN	APPROPRIATION	LIMIT/SUBHEAD	SUPPLEMENTAL ACCOUNTING CLASSIFICATION	ACCTG STA DODAAD	AMOUNT

15. AUTHORIZING OFFICER (Type name and title)	16. SIGNATURE	17. DATE

DD FORM 448 PREVIOUS EDITION IS OBSOLETE

ACCEPTANCE OF MIPR Z4'1

1. TO (Requiring Activity Address) (Include ZIP Code)	2. MIPR NUMBER	3. AMENDMENT NO.
Commander, USATHAMA ATTN: CETHA-RM-B Aberdeen Proving Ground, MD 21010-5401	MIPR3011	1
	4. DATE (MIPR Signature Date): 30 Sep 91	5. AMOUNT (As Listed on the MIPR): $511,000.00

6. The MIPR identified above is accepted and the items requested will be provided as follows: (Check as Applicable)

a. [XX] ALL ITEMS WILL BE PROVIDED THROUGH REIMBURSEMENT (Category I)

b. [ ] ALL ITEMS WILL BE PROCURED BY THE DIRECT CITATION OF FUNDS (Category II)

c. [ ] ITEMS WILL BE PROVIDED BY BOTH CATEGORY I AND CATEGORY II AS INDICATED BELOW

d. [ ] THIS ACCEPTANCE, FOR CATEGORY I ITEMS, IS QUALIFIED BECAUSE OF ANTICIPATED CONTINGENCIES AS TO FINAL PRICE. CHANGES IN THIS ACCEPTANCE FIGURE WILL BE FURNISHED PERIODICALLY UPON DETERMINATION OF DEFINITIZED PRICES, BUT PRIOR TO SUBMISSION OF BILLINGS.

7. [ ] MIPR ITEM NUMBER(S) IDENTIFIED IN BLOCK 13, "REMARKS" IS NOT ACCEPTED (IS REJECTED) FOR THE REASONS INDICATED.

8. TO BE PROVIDED THROUGH REIMBURSEMENT CATEGORY I

ITEM NO. a	QUANTITY b	ESTIMATED PRICE c
	BASIC AMEND !	$311,000.00 $200,000.00 $511,000.00
d. TOTAL ESTIMATED PRICE		$200,000.00

ACCEPTANCE COPY
TO APG
DATE: 30 SEP 91

9. TO BE PROCURED BY DIRECT CITATION OF FUNDS CATEGORY II

ITEM NO. a	QUANTITY b	ESTIMATED PRICE c
d. TOTAL ESTIMATED PRICE		

10. ANTICIPATED DATE OF OBLIGATION FOR CATEGORY II ITEMS

11. GRAND TOTAL ESTIMATED PRICE OF ALL ITEMS
$511,000.00

12. FUNDS DATA (Check if Applicable)

a. [ ] ADDITIONAL FUNDS IN THE AMOUNT OF $ ________ ARE REQUIRED (See Justification in Block 13)

b. [ ] FUNDS IN THE AMOUNT OF $ ________ ARE NOT REQUIRED AND MAY BE WITHDRAWN

13. REMARKS

POC for USACERL is Ms. Rene Knop, CECER-RM-B, (217) 373-6797. Telefax number is (217) 373-6707 or 7222.

14. ACCEPTING ACTIVITY (Complete Address)

Commander and Director, USACERL
ATTN: CECER-RM-B, PO Box 9005,
Champaign, IL 61826-9005

15. TYPED NAME AND TITLE OF AUTHORIZED OFFICIAL
MARILYN J. BURKE, Budget Officer

16. SIGNATURE
Rene Knop

17. DATE
30 Sep 91

DD Form 448-2, JUL 71 PREVIOUS EDITION WILL BE USED UNTIL EXHAUSTED

[85] From: Mark N. Bovelsky 2/26/92 4:57PM (13340 bytes: 302 ln)
cc: Steven L. Chetty, Mark N. Bovelsky
Subject: AAEMIS proposals/timeline changes
-------------------------------- Message Contents --------------------------------
Steve-please act on this to have the money extended to 30 SEP.

Mark

Message-Id: <199202250118.AA05133@osiris.cso.uiuc.edu>

Mark,
The attached proposals reflect the change in timelines you requested for the funding to be extended from 10 JUL to 30 SEP.

Call if you have any questions.

Have you tamed the lions, yet!

Lynne

***** ATTACHMENT: c:\wp51\aaemis3.txt *****

REIMBURSABLE WORK PROPOSAL

HWMIS and HMID ENHANCEMENTS AND MODIFICATIONS

1. STATEMENT OF PROBLEM:

During FY 90, USATHAMA and AEO sponsored the Structured Requirements Analysis Plan (IEM STRAP). During the IEM STRAP several automation needs were addressed. The Army Automated Environmental Management Information System (AAEMIS) will provide the integration of existing systems and the development of new environmental systems as planned during the STRAP. Two systems designated to be part of AAEMIS are the Hazardous Waste Management Information System (HWMIS) and Hazardous Material Identification System (HMID).

The Hazardous Waste Management Information System (HWMIS) is a management tool developed by USA-CERL to aid the Environmental Manager (EM) at an installation in the management of hazardous waste, hazardous material and minimization programs. The Hazardous Materials Identification (HMID) is a tool that provides the EM information on hazardous materials procured and received on the installation. The research problem of "tracking hazardous materials and wastes from 'cradle to grave'" is the impetus behind the HWMIS and HMID systems. An aggregate level HWMIS has been developed to aid upper level environmental managers (MACOM and DA level) in making decisions. The data in the aggregate level database comes from the HWMIS data sets at the installations. Thus, managers at the installation level, the MACOM level, and at DA, will all be working with the same set of data. HWMIS and HMID also address the upward reporting requirements of environmental data to federal, state, local, DoD, and DA. HWMIS and HMID will aid the EM in accounting for the materials used, for the storage of HM and HW, and for the proper disposal of HM and HW.

2. REFERENCE:

Conversation between Mark Bovelsky(USATHAMA), Paul Stone (USATHAMA) and Lynne Mikulich during FY 91 meetings at USACERL and USATHAMA.

Meetings with Mark Bovelsky (USATHAMA), Lynne Mikulich (USACERL) and CPT Steve Chetty (USATHAMA) during October, December, and January.

3. OBJECTIVE:

The objective is to provide modifications and enhancements to the HWMIS and HMID in order to meet the demands of Army personnel using HWMIS. These modifications and enhancements to the HWMIS system will aid in the Compliance and the HAZMIN emphasis within the Army (the Environmental Compliance Achievement Program (ECAP).

4. APPROACH:

Task 1 - Facilitate user group meeting to include installation representatives from each MACOM. Purpose of user group is to aid in designing enhancements to HWMIS and HMID. Provide travel and perdiem for seven installation environmental managers to attend user group meetings.

APR 91	$ 5K	Research Assistance
	$10K	Travel and per diem for Group Attendance

Total	$15K	

Task 2 - Analyze user group enhancement recommendations and determine appropriate enhancements and modifications with USATHAMA personnel.

MAR/APR 91	$ 5K	Research Assistance
	$ 2K	Travel

Total	$ 7K	

Task 3 - Develop priority list for modifications and/or enhancements.

APR/MAY 91	$10K	Research Assistance
	$ 2K	Travel

Total	$12K	

Task 4 - Design and develop modifications and /or enhancements to HWMIS and HMID. Include Turbo C ++ and DBVista conversions. Decisions were made by USATHAMA and AEO to develop the HAZTRK software under ISM. The development of HWMIS has been delayed until the HAZTRK system data requirements. HWMIS will be the reporting software for ECs at the installation. HWMIS modules that are not incorporated into HAZTRK may be retained under HWMIS as determined by USATHAMA. The programming efforts were mostly completed during November. The functional specifications for HAZTRK were held 16 - 20 December. The PM-ISM has not received the functional specifications or the order to continue from the Director of Management. Therefore, the time schedules for completing HWMIS has been delayed. Request that USATHAMA extend the funding resources from ~~10 July 19~~92 16 Mar 92 to the end of this fiscal year.

MAY-DEC 91	$120K	(3 programmers, 2 programmer/analysts)
JAN-SEP 92	$ 43K	(3 programmers, 2 programmer/analysts)
	$ 8K	Travel
	$ 20K	Hardware (optional)

Total	$191K	what for, when

Task 5 - Present modifications and/or enhancements to USATHAMA for further comment. Provide internal and external documentation for HWMIS and HMID.

SEP 92	$ 1K	Programmer/analysts
	$ 5K	Travel
	$ 2K	Printing costs — software production costs?

Total	$ 8K	distribution costs?

Task 6 - Test and evaluate HWMIS and HMID at three sites (TRADOC, FORSCOM, and AMC). Provide hardware where necessary.

?

SEP 92	$ 8K	Programmer/analysts
	$ 12K	Travel
	$ 40K	Hardware (optional for test sites)

Total	$ 60K	

Seems excessive

duration of tests, type of hardware

Task 7 - Finalize HWMIS and HMID. Provide internal and external documentation for both systems.

SEP 92	$ 6K	Programmer/analysts
	$ 2K	Travel
	$ 10K	Printing costs

Total	$ 18K	

5. PRODUCT OF RESEARCH:

The product of this effort will be HWMIS and HMID system enhancements and modifications to be field tested by USATHAMA. Internal and user documentation will also be produced.

6. COST ESTIMATE:

The approximate cost of this effort will be 311K.

7. COMPLETION TIME:

September 30, 1992.
Time schedule is delayed because of USATHAMA and AEO sponsoring the design and development of HAZTRK under the Installation Support Module umbrella. HWMIS will need to interface with HAZTRK in order to complete this mission.

COSTS

APR - DEC '91	154 K
JAN - SEP '92	157 K

62 1.i.W

DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORY, CORPS OF ENGINEERS
P.O BOX 4005
CHAMPAIGN, ILLINOIS 61824-4005

REPLY TO
ATTENTION OF

CECER-RM (37-2-10hh)

11 December 1990

MEMORANDUM FOR Commander, U.S. Army Toxic and Hazardous Materials Agency, ATTN: CETHA-RM-B, Aberdeen Proving Ground, MD 21010-5401

SUBJECT: Final Cost Reimbursable Services (VTB)

1. Reference your DD Form 448, MIPR Number MIPR3959, dated 08/14/89.

2. Work authorized by above reference has been reviewed and fund status is as follows:

a. Amount Authorized: $ 60,000.00

b. Final Cost: $ 59,839.22

c. Excess Funds: $ 160.78

3. Excess funds are hereby returned. Our financial records have been adjusted accordingly. Request your unliquidated obligation be decreased by this amount also. No further action is required. This letter is being used as Change No. 1 to referenced reimbursable order. If you desire to issue a confirmatory change order, it also should be issued as Change No. 1.

4. Questions regarding this issue should be addressed to Mr. Don LaJoie at (217) 373-7212.

FOR THE COMMANDER AND DIRECTOR:

DONALD J. LAJOIE
Chief, Finance Branch

Please deob

78278960 580HXW 789000 444G
<160.78>

FILE

MILITARY INTERDEPARTMENTAL PURCHASE REQUEST # VT9

1. PAGE 1 OF 2 PAGES

2. FSC	3. CONTROL SYMBOL NO.	4. DATE PREPARED	5. MIPR NUMBER	6. AMEND NO.
		14 Aug 89	MIPR3959	ORIG

7. TO: Commander, U.S. Army Construction Engineering Research Laboratory
2902 Newmark Dr., P.O.Box 4005 (M. Burk)
Champaign, IL 61824-4405

8. FROM: (Agency, name, telephone number of originator)
Commander, U.S. Army Toxic and Hazardous Materials Agency, ATTN: CETHA-RM-B
Aberdeen Proving Ground, MD 21010-5401
AUTOVON 584-4332, Commercial 301-676-8087

9. ITEMS ☐ ARE ☐ ARE NOT INCLUDED IN THE INTERSERVICE SUPPLY SUPPORT PROGRAM AND REQUIRED INTERSERVICE SCREENING ☐ HAS ☐ HAS NOT BEEN ACCOMPLISHED.

ITEM NO. a	DESCRIPTION (Federal stock number, nomenclature, specification and/or drawing No., etc.) b	QTY. c	UNIT d	ESTIMATED UNIT PRICE e	ESTIMATED TOTAL PRICE f
1	FY89 funds in support of Project HXW, HAZMIN, HQDA-AEO. Funds for in-house effort for the preparation of an integrated hazardous materials/hazardous plan as it pertains to acquisition, procurement distribution, use, storage, and disposal.			ORIG	$ 60,000.00
2	Expiration date for obligation of this order is 30 Sep 89.				
3	USATHAMA Financial POC Carla Zealor CETHA-RM-B, AUTOVON 584-4332/4331 or commercially at 301-676-8087. Technical POC: Ed Smith/Steve Maloney, USACERL, 217-352-6511, ext. 232. Financial POC: Marilyn Burk, USACERL (CECER-RM), 217-373-7208				
4	Request acceptance be expedited by DATAFAX (AV584-2008; commercial 301-671-2008) and two signed copies of the enclosed acceptance document (DD448-2) be forwarded to address in block 8.				
5	Process disbursement vouchers (SF 1080) monthly through the TFO System. Forward to the Cdr, USAAPGSA, ATTN: STEAP-RM-FG-P, Aberdeen Proving Ground, MD 21005-5001. Indicate on the SF 1080 the order number, accounting classification and expenditure order data.				

10. SEE ATTACHED PAGES FOR DELIVERY SCHEDULES, PRESERVATION AND PACKAGING INSTRUCTIONS, SHIPPING INSTRUCTIONS AND INSTRUCTIONS FOR DISTRIBUTION OF CONTRACTS AND RELATED DOCUMENTS.

11. GRAND TOTAL $ 60,000.00

12. TRANSPORTATION ALLOTMENT (Used if FOB Contractor's plant)

13. MAIL INVOICES TO (Payment will be made by)
Cdr, USAAPGSA, ATTN: STEAP-RM-FP-V
APG, MD 21005 5001

PAY OFFICE DODAAD

14. FUNDS FOR PROCUREMENT ARE PROPERLY CHARGEABLE TO THE ALLOTMENTS SET FORTH BELOW, THE AVAILABLE BALANCES OF WHICH ARE SUFFICIENT TO COVER THE ESTIMATED TOTAL PRICE.

ACRN	APPROPRIATION	LIMIT/SUBHEAD	SUPPLEMENTAL ACCOUNTING CLASSIFICATION	ACCTG STA DODAAD	AMOUNT
	2192020		08-8160 P788008.14 2572 MIPR39597827896058 OHXW CC789000 EOC444	S18001	$ 60,000.00

15. AUTHORIZING OFFICER (Type name and title)
H. R. FEINBERG, C, Resr Mgt Div

16. SIGNATURE

17. DATE 8/14/89

DD FORM 1 JUN 72 448 PREVIOUS EDITION IS OBSOLETE.

MILITARY INTERDEPARTMENTAL PURCHASE REQUEST #VT9

1. PAGE 1 OF 2 PAGES

2. FSC	3. CONTROL SYMBOL NO.	4. DATE PREPARED	5. MIPR NUMBER	6. AMEND NO.
		14 Aug 89	MIPR3959	ORIG

7. TO:
Commander, U.S. Army Construction Engineering Research Laboratory
2902 Newark Dr., P.O.Box 4005 (M. Burk)
Champaign, IL 61024-4405

8. FROM: (Agency, name, telephone number of originator)
Commander, U.S. Army Toxic and Hazardous Materials Agency, ATTN: CETHA-RM-B
Aberdeen Proving Ground, MD 21010-5401
AUTOVON 584-4332, Commercial 301-676-8087

9. ITEMS ☐ ARE ☐ ARE NOT INCLUDED IN THE INTERSERVICE SUPPLY SUPPORT PROGRAM AND REQUIRED INTERSERVICE SCREENING ☐ HAS ☐ HAS NOT BEEN ACCOMPLISHED.

ITEM NO. a	DESCRIPTION (Federal stock number, nomenclature, specification and/or drawing No., etc.) b	QTY. c	UNIT d	ESTIMATED UNIT PRICE e	ESTIMATED TOTAL PRICE f
6	This order is placed in accordance with the provisions of 41 USC 23 and DODI 7220.1.				
7	Certified as to availability of funds not to exceed $60,000.00 under the appropriation cited in Block 14 by:				
	Carla J Zalor 8/14/89 FOR: S. GAST Finance & Accounting Officer				

10. SEE ATTACHED PAGES FOR DELIVERY SCHEDULES, PRESERVATION AND PACKAGING INSTRUCTIONS, SHIPPING INSTRUCTIONS AND INSTRUCTIONS FOR DISTRIBUTION OF CONTRACTS AND RELATED DOCUMENTS.

11. GRAND TOTAL

12. TRANSPORTATION ALLOTMENT (Used if FOB Contractor's plant)

13. MAIL INVOICES TO (Payment will be made by)

PAY OFFICE DODAAD

14. FUNDS FOR PROCUREMENT ARE PROPERLY CHARGEABLE TO THE ALLOTMENTS SET FORTH BELOW, THE AVAILABLE BALANCES OF WHICH ARE SUFFICIENT TO COVER THE ESTIMATED TOTAL PRICE.

ACRN	APPROPRIATION	LIMIT/SUBHEAD	SUPPLEMENTAL ACCOUNTING CLASSIFICATION	ACCTG STA DODAAD	AMOUNT

15. AUTHORIZING OFFICER (Type name and title)

16. SIGNATURE

17. DATE

DD FORM 1 JUN 72 448

PREVIOUS EDITION IS OBSOLETE.

ACCEPTANCE OF MIPR

#VT9

1. TO (Requiring Activity Address) (Include ZIP Code)
COMMANDER, U.S. ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY, ATTN: CETHA-RM-B
ABERDEEN PROVING GROUND, MD 21010-5401

2. MIPR NUMBER: MIPR3A959
3. AMENDMENT NO.: ORIG
4. DATE (MIPR Signature Date): 14 Aug 89
5. AMOUNT (As Listed on the MIPR): $ 60,000.00

6. The MIPR identified above is accepted and the items requested will be provided as follows: (Check as Applicable)
- a. [X] ALL ITEMS WILL BE PROVIDED THROUGH REIMBURSEMENT (Category I)
- b. [ ] ALL ITEMS WILL BE PROCURED BY THE DIRECT CITATION OF FUNDS (Category II)
- c. [ ] ITEMS WILL BE PROVIDED BY BOTH CATEGORY I AND CATEGORY II AS INDICATED BELOW
- d. [ ] THIS ACCEPTANCE FOR CATEGORY I ITEMS, IS QUALIFIED BECAUSE OF ANTICIPATED CONTINGENCIES AS TO FINAL PRICE. CHANGES IN THIS ACCEPTANCE FIGURE WILL BE FURNISHED PERIODICALLY UPON DETERMINATION OF DEFINITIZED PRICES, BUT PRIOR TO SUBMISSION OF BILLINGS.

7. [ ] MIPR ITEM NUMBER(S) IDENTIFIED IN BLOCK 13, "REMARKS" IS NOT ACCEPTED (IS REJECTED) FOR THE REASONS INDICATED.

8. TO BE PROVIDED THROUGH REIMBURSEMENT CATEGORY I			9. TO BE PROCURED BY DIRECT CITATION OF FUNDS CATEGORY II		
ITEM NO. a	QUANTITY b	ESTIMATED PRICE c	ITEM NO. a	QUANTITY b	ESTIMATED PRICE c
	ORIG	$ 60,000.00			
d. TOTAL ESTIMATED PRICE		$ 60,000.00	d. TOTAL ESTIMATED PRICE		

ACCEPTANCE COPY
TO APG
DATE: 16 AUG 89

10. ANTICIPATED DATE OF OBLIGATION FOR CATEGORY II ITEMS:

11. GRAND TOTAL ESTIMATED PRICE OF ALL ITEMS: $ 60,000.00

12. FUNDS DATA (Check if Applicable)
- a. [ ] ADDITIONAL FUNDS IN THE AMOUNT OF $________ ARE REQUIRED (See Justification in Block 13)
- b. [ ] FUNDS IN THE AMOUNT OF $________ ARE NOT REQUIRED AND MAY BE WITHDRAWN

13. REMARKS

14. ACCEPTING ACTIVITY (Complete Address)
Commander, USACERL
ATTN: CECER-RMB (R. Brown)
P.O. Box 4005, Champaign, IL 61824-4005

15. TYPED NAME AND TITLE OF AUTHORIZED OFFICIAL
MARILYN J. BURKE, Budget Analyst

16. SIGNATURE: Marilyn J. Burke

17. DATE: 15 Aug 89

DD FORM 448-2, 1 JUL 71 — PREVIOUS EDITION WILL BE USED UNTIL EXHAUSTED.

MIPR 3959
[illegible] 14 AUG 89

FUNDING AUTHORIZATION/ CHANGE ACTION [illegible]

Description/Performer/Funding Detail — Funds Issue

Task	Description	Performer/ Installation	Funding Doc#	Task APP	Prior Amount	Inc/Dec	Updated Amount
01.00.00	THAMA TBD			$0.00	$.00	$.00	$.00
01.16.01	HAZ MAT/WST PLAN	CECEL	MIPR	$60,000.00	$0.00	$60,000.00	$60,000.00
01.16.03	PROPOSAL P-38119(REV 2)	ANL	MIPR3519	$200,000.00	$200,000.00	$.00	$200,000.00
04.00.00	DOE TBD			$0.00	$.00	$.00	$.00
04.16.01	WORKSHOP, CCONUS SUPPORT	CECEL	FAD	$14,000.00	$14,000.00	$.00	$14,000.00
04.16.02	HAZMIN INTERVENTION STUDY	CECEL	FAD	$350,000.00	$350,000.00	$.00	$350,000.00
04.16.03	HAZ MAT/WST PLAN	CECEL	FAD	$90,000.00	$40,000.00	$[illegible].00	$9[illegible],000.00
04.16.04	HAZ MATERIAL TRK'G SYS	CECEL	FAD	$50,000.00	$50,000.00	$.00	$50,000.00
			TOTALS=	$764,[illegible]	$704,[illegible]	$[illegible]	$764,[illegible]

DETTE-TAC $295.00

Recommendation - Project Officer	Concurrence -Chief Fac- Resource Anal
Michael J. Dette	[signature]
Approval - Division Chief	Threshold Approval Required
[signature]	✓ DA 8/11/89
Threshold Approval - Commander	Date Executed - RMO

THAMA Form 5, 01 Oct 88, Replaces 1 Aug [illegible] edition which is obsolete.

[illegible]

[illegible]

Task: [illegible]	Technical POC	Procurement POC	Financial POC
Funding Docs: [illegible]	M. DETTE	COR, CERL	
Obligation Date:	USATHAMA	ATTN: M. BURKE	
Date SOW to Proc:			
Est Award Date:			
Completion Date:	[illegible]	[illegible]	
Contract No:			Datafax:
Company Name:			

Comments:
[illegible]
[illegible]
MENT, DISTRIBUTION, USE, STORAGE AND DISPOSAL [illegible]
FAX TO [illegible]

POC ED SMITH, [illegible]

Task: 04.15.03	Technical POC	Procurement POC	Financial POC
Funding Docs: FAD	MIKE DETTE	COR, USACERL	
Obligation Date: / /	USATHAMA	ATTN: M. BURKE	
Date SOW to Proc: / /			
Est Award Date: / /			
Completion Date: / /	301-671-4714	217-373-7205	
Contract No:			Datafax:
Company Name:			

Comments:
FY89 HAZMIN FUNDS TO BE PROVIDED TO USACERL FOR PREPARATION OF AN INTEGRATED HAZARDOUS MATERIALS/HAZARDOUS WASTE PLAN. PROJECT WAS AGREED TO BY ACE AND DCSLOG. THE CERL POC IS MR. ED SMITH, (217) 352-6511, EXT 333.

****
AFP ORIGINALLY $909.5 FOR HQDA. REDISTRIBUTED AS FOLLOWS: [illegible] AMC, [illegible] WESTCOM, $504 CERL, $.9 THAMA(DETTE), $200K AML, $33.[illegible] AEHA.
$59.4 FROM FORSCOM.

62

FIVE YEAR INTEGRATED HAZARDOUS MATERIAL/HAZARDOUS WASTE MANAGEMENT PLAN

PREPARED FOR:

OFFICE OF THE SECRETARY OF THE ARMY FOR RESEARCH, DEVELOPMENT, AND ACQUISITION

DEPUTY CHIEF OF STAFF FOR LOGISTICS

AND

ARMY ENVIRONMENTAL OFFICE

BY:

U.S. ARMY CONSTRUCTION ENGINEERING RESEARCH LABORATORY
CHAMPAIGN, ILLINOIS

SEPTEMBER, 1990

FNcl. 1

TABLE OF CONTENTS

TABLE OF CONTENTS

Five-Year Integrated Hazardous Material/Hazardous Waste Management Plan

I PLAN GOALS:

Identify actions that will, when implemented, provide more efficient and effective management of hazardous materials and hazardous wastes within the U.S. Army.

Reduce ultimate disposal of hazardous waste to the greatest extent practicable.

Prevent Pollution using Source Reduction, Recycle/Reuse, and Energy Recovery (rather than end-of-pipe treatment).

Ensure compliance with all applicable Federal, State, Host Nation and Local Environmental Regulations while maintaining Mission Readiness with public support.

II EXECUTIVE SUMMARY:

The Five-Year Integrated Hazardous Material/Hazardous Waste Management Plan has been developed in response to a memorandum from the Assistant Chief of Engineers (MG Offringa), dated 19 June 1989, and DOD Directive 4210.15 (Hazardous Material Pollution Prevention), dated 27 July 1989. The memorandum acknowledged the many useful efforts ongoing within the Army, but also recognized the need for some institutional changes within the Army.

This plan provides the framework to solidify the partnership between the Assistant Secretary of the Army (Research, Development and Acquisition) [ASA(RDA)], Deputy Chief of Staff for Logistics (DCSLOG) and the Assistant Chief of Engineers (ACE). Institutional changes are ~~recommended~~ in aspects of the acquisition, logistics support and procurement processes which allow the "cradle-to-grave" costs to be ~~allocated~~ identified to contracts or equipment or service

The plan also highlights the need for a corporate commitment to hazardous material/hazardous waste management, efficient and accurate tracking systems, and proper training and education. The plan was developed as a group effort drawing expertise from the affected parties as well as technology developers. As such, it represents a consensus of needed efforts to manage thirteen separate issues identified by the workgroup. In all, 55 individual action items are recommended.

It is anticipated that the progress of this plan will be reviewed, and required actions updated, on an annual basis. This review and update should be undertaken by the original workgroup or designees from their organizations, to provide consistency and direction.

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And material we acquire manufacture

III BACKGROUND:

The use of hazardous materials is fundamental to the readiness mission of the Army, arising from such areas as, but not limited to, weapon development and testing, training, equipment repair, and machinery maintenance. As a result, the Army is a large user of hazardous materials and large generator of hazardous waste (approximately 100,000 metric tons annually). Management of such materials is becoming more complex and time consuming due to recent environmental legislation which imposes new reporting requirements and expands the list of controlled materials. Costs for land disposal of hazardous waste, in particular, have risen dramatically, from $15/metric ton in the early 1970s, to $240 by 1986, and alternatives to land disposal are 200% to 500% ($500-1,200/metric ton) more costly (EPA, 1986).

Environmental legislation is restricting land disposal of many materials, and mishandling hazardous materials can lead to prosecution and conviction under federal law. The Army had almost 150 Notices of Violation in 1987, and over 75 in 1988, arising from hazardous materials/hazardous waste (HM/HW). Historically, environmental engineers have designed only end-of-pipe treatment strategies. However, the current emphasis is on pollution prevention rather than treatment.

Private industry has responded by developing better management practices and hazardous waste minimization strategies, including methods to assign cost to discrete waste generating activities. Army installations are also responding to the new environmental legislation, but the effort has not been centrally focused. This leads to many islands of effort which may overlap, and data collection and storage systems which are not compatible.

One problem Army installations experience is the almost complete disconnect between acquisition and production cost and waste disposal cost. Army weapons programs and installations plan and budget acquisition and operating costs, but a central DOD agency (Defense Reutilization and Marketing Service) is responsible for the wastes. Another problem is the heavy reliance on military specifications written while a system was under development (often 10-20 years earlier), which can limit a contractor's or an installation's ability to modify its maintenance operations. This decentralized corporate structure in the Army minimizes the cost incentive to tightly control waste generation, while specifications can tie the hands of innovators.

The Army systems acquisition process presents another set of problems in the management of hazardous materials. The process requires a long time from concept to final production, and decisions made throughout the process are not currently required to include hazardous waste minimization (HAZMIN) considerations. This procedure is based on optimizing production and maintenance

with pollution treatment to be identified by the producer and end user after the production and maintenance processes are established. Program Executive Offices (PEOs) and Program Managers (PMs) (in this document, these terms include all materiel developers) often do not consider the issues of hazardous materials/hazardous wastes during development, and do not use HAZMIN as a source selection criteria in the evaluation of contractors, weapons systems, or products.

The Five-Year Integrated Hazardous Material/Hazardous Waste Management Plan will summarize the issues and constraints faced by the Army. It will propose a management structure to assign cradle-to-grave costs to materials at the installation level, including an accounting feed-back mechanism. At the DA level, it will propose a management structure to intervene in the acquisition and logistics support processes to minimize future hazardous waste generation, provide technical assistance and review to Program Managers, review and rewrite (as necessary) military specifications, and provide coordination of RDT&E efforts within the Army.

Management of HM/HW is a program with a strong potential to save money overall in life cycle costs. It also enhances the Army's capability to be a smart buyer of commercially available materials.

A. Purpose:

The plan's purpose is to solidify the partnership between the Assistant Chief of Engineers, Deputy Chief of Staff for Logistics and the Office of the Assistant Secretary of the Army (Research, Development and Acquisition) with a unified approach toward management of hazardous material/hazardous waste including cradle-to-grave cost accounting, material accounting/tracking techniques, training requirements, technology development and implementation, funding, and staffing, which:

* Minimizes generation and disposal of hazardous waste
* Eliminates program delays attributable to environmental issues.
* Identifies constraints to effective HM/HW management
* Ensures compliance with all Federal, State and Local regulations
* Reduces overall production and disposal cost,
* Recommends actions and implementation milestones, and
* Enhances and maintains mission readiness
* Integrates safety in HM/HW management

B. Issues:

The following are the fundamental issues which the workgroup identified for consideration in this plan. Each issue will be

examined in greater detail in Section IV with recommended responsibilities and milestones for implementation.

1) Environmental Considerations in Systems Acquisition
2) Environmental Project Funding
3) Environmental Considerations in Procurement Policy
4) Technology Transfer and Implementation
5) Environmental Education and Training
6) Material Tracking and Quantification
7) Liability
8) Centralized Coordination of Effort, in partnership with ACE, DCSLOG and ASA(RDA)
9) Command Emphasis
10) Multi-Functional Effort
11) Environmental Staffing and Organization
12) Review and Update of Military Specifications and Procedures
13) Environmental Quality Control Committee, Charge and Authority

Although each issue is unique, there are several common concepts expressed throughout.

Central Information/Coordination: Many issues address the need for centralized support and information. Issue 1) requires a source of technical information for methods to avoid hazardous waste generation by design changes during development. Issue 4) requires a "one-stop" centralized organization to transfer technology to the field and provide the incentive for change. Issue 8) needs one source to coordinate efforts, with the expertise to understand differences and minimize overlap of effort. At the installation level, Issues 3), 9) and 13) require a central body of expertise to provide input to purchase and use of hazardous materials, and to provide a high level, central POC for environmental problems.

Training: Although a separate issue, it impacts several other issues as well, including Issues 6) and 8). The Army needs to elevate its consciousness to the environmental effects of its day-to-day operations.

Authority: The environmental coordinator has not yet received a high level of authority on all Army installations. However, the requirements are ever increasing, as evidenced by some 30 new or revised laws passed since the 1970s. Thus, although the environmental responsibilities and the requirements to interact with other activities (utilities, production facilities, etc.) have increased dramatically, no commensurate increase in authority has occurred.

IV REQUIREMENTS, ACTIONS and RESPONSIBILITIES:

This section discusses each issue, providing a list of requirements, actions and responsibilities which provide a solution to the issues. Section V details the responsibilities of each organization, and provides a time line for completion. All actions are identified by a number corresponding to the issue to which it is associated, and a letter, to separate multiple actions under a single issue.

ISSUE #1

ENVIRONMENTAL CONSIDERATIONS IN SYSTEMS ACQUISITION

b. REQUIREMENT: A cost analysis methodology needs to be developed/identified that captures the life cycle costs (to include, storage, handling, treating and disposing) of using current HM and proposed alternative substances and processes. This will result in a more meaningful data base for use by the PM/PEO in assessing tradeoffs of environmentally acceptable substances and processes during the early R&D efforts.

ACTION: Develop an Army Materials Assessment Procedure which addresses material fate and projected treatment and disposal costs. Initial costs will be based on estimates of the fates of materials (to air, water, solid, sludge, etc.), and later refined by material mass balances derived from the material tracking and quantification system.

RESPONSIBILITY: Assistant Chief of Engineers (ACE), AMC, Deputy Chief of Staff for Logistics (DCSLOG), DASAF

c. REQUIREMENT: Statements of work for development contracts need to contain the requirement for the system or product contractors to minimize the HM used in the system and in the manufacture and subsequent maintenance of the system.

ACTION: Require contractors, as part of their proposals, to 1) identify all HM/HW to be used or produced and estimate volume and cost for disposal; 2) require identification and evaluation of alternatives which will reduce volume or toxicity of wastes; and 3) submit written evaluation of residual material fate using the Army Material Assessment Procedure, for all hazardous materials proposed for use. Review these inputs at source selection evaluation.

RESPONSIBILITY: Assistant Secretary of the Army (Research, Development and Acquisition) [ASA(RDA)], AMC, DASAF

d. REQUIREMENT: Hazardous material and hazardous waste minimization and pollution prevention should also be included as an evaluation factor whenever materials, processes or methods are specified or otherwise required which require the contractor to acquire or use hazardous materials or to generate hazardous waste. Greater weight or proposal evaluation credit should be accorded to those offerors who propose the most beneficial hazardous material minimization or hazardous waste pollution prevention products, services or processes.

ACTION: Provide a description of the Material Assessment Procedure within the Request For Proposal (RFP). Require a list of alternatives considered and results determined. Utilize Best Value/Quality of the item/system above the lowest ~~bid.~~ price.

RESPONSIBILITY: ASA(RDA), AMC, DASAF

e. REQUIREMENT: Personnel with sufficient environmental training and experience must be included in the source selection process to assist in development of the Scope of Work, Source Selection Plan, evaluation criteria and in the actual review and evaluation of proposals (e.g., source selection evaluation board and source selection advisory council). As a minimum these personnel must be trained and have technical experience in: weapons system acquisition, design, environmental considerations, industrial engineering and safety.

ACTION: Select a committee of personnel representing weapons system acquisition, design, environmental considerations, industrial engineering and safety; train them in the Material Assessment Procedure for use in source selection, and risk assessment for handling/use/storage of HM.

RESPONSIBILITY: ASA(RDA), AMC, ACE, Office of the Surgeon General (OTSG), DASAF

f. REQUIREMENT: Training courses now available should be used and where necessary should be developed to educate system and product Research and Development (R&D) personnel, maintenance personnel, and production personnel in the technical aspects of minimizing and managing HM/HW.

ACTION: Provide funds to develop courses on Army developed HAZMIN and tracking/quantification procedures and require instruction on these to same personnel. Provide funds for these personnel to complete training required under:

1) Department of Transportation (49 CFR 173-177),

2) Occupational Safety and Health Administration (29 CFR 1910.1200),

3) Resource Conservation and Recovery Act (40 CFR 264.16 and 265.16),

4) Superfund Amendments and Reauthorization Act Title III.

RESPONSIBILITY: ACE, Deputy Chief of Staff for Personnel (DCSPER), AMC, ASA(RDA), DASAF

g. REQUIREMENT: Army acquisition regulations need to be revised (or in some cases developed) to adequately mandate the requirements and actions listed above. In addition, the Army needs to influence appropriate changes to regulations controlled by other Federal Agencies.

ACTION: Adopt revisions anticipated under SARDA Study I. Pass request through DA to DOD or other appropriate agency for regulations which are under control of other Federal agen-

cies, including a description of the revisions used in SARDA Study I.

RESPONSIBILITY: ASA(RDA), AMC, TRADOC, DCSLOG

h. REQUIREMENT: Where HM/HW are associated with the design, production or maintenance of a system, the development/production contractor will identify them and propose the actions they will take to eliminate these substances or justify their use as early in the development phases as possible (preferably as materials are specified for prototype design) but not later than the decision to enter production.

ACTION: The Program Manager/Program Executive Office (PM/PEO) will include program requirements and resources in his program master plans such as the Integrated Logistics Support Plan (for Logistics aspects such as maintenance), the Test and Evaluation Master Plan (for evaluation of alternative substances), the Production Readiness Master Plan (for alternate manufacture and materials/processes) System Safety Program Plan and System Manpower and Integration Plan.

RESPONSIBILITY: ASA(RDA), AMC, DCSLOG

i. REQUIREMENT: In addition to all accountable costs, a risk assessment needs to be performed. Transporting, storing and using materials ~~on post~~ introduces a systematic risk of spillage, explosion, etc., which cannot be directly quantified. However, an analysis of previous systematic risk patterns use can assign the probable frequency of accidents. This additional risk — premium should be added to the total known cost for each ~~bid~~ proposal received. For materials which are not hazardous to the environment, a risk premium of zero is assigned.

ACTION: Develop a risk premium calculation method and add that premium to all bids before selection. Alternatively, bids not containing materials hazardous to the environment could be assigned a high weighting in selection.

RESPONSIBILITY: ACE, Major Commands (MACOMs), DASAF, OTSG

j. REQUIREMENT: A body of expertise (existing organizations or new) needs to be developed/identified which can proactively assist the PM/PEO's and other managers of new equipment early in the R&D phases before programs have environmental problems. This organization will also perform an independent (i.e., third party) review and assessment of the programs prior to major milestones (Defense Acquisition Board, Army Systems Acquisition Review Council, In-Process Review). This organization must contain expertise in; system acquisition, design, environmental and industrial engineering, and safety.

ISSUE #2

ENVIRONMENTAL PROJECT FUNDING

ACTION: Establish multi-disciplinary team of expertise in system acquisition, design, environmental and industrial engineering, and safety for source selection evaluation to proactively assist the PM/PEO's and other managers of new equipment and perform an independent (i.e., third party) review and assessment of the programs prior to major milestones (Defense Acquisition Board, Army Systems Acquisition Review Council, In-Process Review).

RESPONSIBILITY: ASA(RDA), AMC, ACE, OTSG, DASAF

Issue #2 - Environmental Project Funding

Problem Statement: Other than the Defense Environmental Restoration Account (DERA), which is set aside to clean up sites previously contaminated with HW, there is no central, real-time funding source for environmental projects and needs. Presently funds for environmental projects come primarily from installation Operation and Maintenance accounts (OMA) on an as-available basis. Additionally OMA and other funding sources (Military Construction Army (MCA), Unspecified Minor Military Construction Account (UMMCA), Army Industrial Fund (AIF), etc.) have constraints as to time before receipt, time to obligate or total dollar amount. MCA, at best, is a five year cycle. UMMCA, although a quicker response method is limited to one million dollars. Often the requirement for an environmental project is an Environmental Protection Agency, or state environmental agency, Notice of Violation or Compliance Agreement which usually contain time frames for correction of very short duration.

Actions Required:

a. REQUIREMENT: A separate Army Management Structure (AMS) code for environmental program elements (HM/HW Management and HAZMIN) needs to be initiated in the funds tracking system. This will assure visibility of environmental program funds requirements in the budgetary process and insure tracking of funds utilized for the execution of environmental program elements.

ACTION: Establish AMS codes for environmental program elements. HM/HW Management and HAZMIN projects should be independently flagged. AMS coding should be consistent with the needs and priorities identified in the RCS:1383 Report.

RESPONSIBILITY: Assistant Secretary of the Army (Financial Management) [ASA(FM)], Assistant Secretary of the Army (Installations, Logistics, and Environment) [ASA(I,L&E)]

b. REQUIREMENT: An MCA buyout program, similar to the buyout for Child Development Centers (in which MCA funds could be reprogrammed by installations to accelerate CDC construction ahead of other planned projects), to comply with intermediate and long range environmental goals should be established. Institutionalize streamlined procurement policies for HM/HW corrective (proactive and reactive) actions, studies and equipment. This will permit more flexibility and improved responsiveness.

ACTION: Identify the structure and requirements for an MCA buyout program similar to that used for Child Development Centers (in which MCA funds could be reprogrammed by installations to accelerate CDC construction ahead of other planned projects).

RESPONSIBILITY: ASA(FM).

ISSUE #3

ENVIRONMENTAL CONSIDERATIONS IN PROCUREMENT POLICY

Charge bid to proper

Issue #3 - Environmental Considerations in Procurement Policy

Problem Statement: Regulations governing procurement of materials can be quite complex to non-procurement personnel. Materials brought onto an installation can be procured through a number of methods including centralized purchase (through Defense Logistics Agency [DLA]), local purchase (at an installation) or purchase by a contractor for use on an installation. Regardless of mechanism, the installation becomes the responsible party for all materials on the installation. Items which are bid openly are then selected based on the least first cost, with no mechanism to assign "cradle-to-grave" cost. This presents a significant problem for items which cost more to dispose of than to acquire (for example, one major automobile manufacturer found that for each $1 initial cost of solvent, there was a $4 cost for disposal).

Approval for purchase is most often related to the dollar value of a purchase. Occasionally, the material type may require special approval, such as purchase of radioactive materials. Most hazardous materials, or materials which produce a hazardous waste, do not require any special approval for purchase.

Purchase of materials via performance standards can lead to the generation of hazardous waste when two dissimilar materials (each which meets the performance criteria individually) are commingled. In addition, HAZMIN methods developed for one material may be less effective when a new material (which is different but still meets performance specifications) is used. Sole source purchases are one method to control accidental generation of HW through commingling of materials purchased through performance specifications, or through changes in materials already undergoing HAZMIN methods.

Lastly, materials are delivered to several locations. This provides little opportunity for direct control of material flow on-post.

Actions Required:

a. REQUIREMENT: The total use cost of a material, to include transport, treatment, storage and disposal, should be included in the initial cost. The method to do this requires an assessment of the fate of the material (incorporation in product, volatization, removal as contaminated waste, discharge to wastewater, discharge with sludge), with the costs associated with its various fates assessed at the point of bid review.

ACTION: Provide the Army Material Assessment Procedure to all bidders on a contract, and require them to perform this assessment on their product to produce the bid. Provide estimates of material fate for the process to the bidders. Review

the method calculation as part of bid evaluation and assign the proper calculated cost for an overall bid. This extends the Material Assessment Procedure required for PMs/PEOs in systems acquisition to all contracts including those for off-the-shelf items.

RESPONSIBILITY: MACOMs, DCSLOG, ASA(RDA)

b. REQUIREMENT: The use of materials which are not hazardous nor produce hazardous wastes, in place of materials of equivalent performance which are hazardous or produce hazardous wastes, should be justification for the use of a sole source procurement action.

ACTION: Develop guidelines for the sole source justification of non-hazardous materials, or materials which do not generate hazardous wastes, in place of equal performance materials which are hazardous, or which generate hazardous waste.

RESPONSIBILITY: Deputy ASA(Procurement)

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ISSUE #4

TECHNOLOGY TRANSFER AND IMPLEMENTATION

2) specific needs and desires of potential users;
3) probable costs to implement at each applicable site;
4) funding, sources, mechanisms, and command commitment;
5) identifiction of point at which product transitions to the responsibility of the user; and,
6) requirements for in-progress reviews during the conduct of R&D.

Technology transfer could be enhanced by a centralized HM/HW technology transfer agency or proponent within the Army. The responsibilities of this agency would address the issues described by providing for:

1) Coordination of R&D between government organizations as well as the private sector to include information management and the conduct of symposia and workshops;

2) the establishment of a "Support Organization" to provide the link between R&D and the user thereby supporting the use of R&D products; and,

3) the development of an implementation strategy to ensure that R&D plans specifically provide for implementation of the ultimate R&D product.

Actions Required:

a. REQUIREMENT: Central coordination of technology transfer for HM/HW initiatives now being developed by many Army and DOD facilities with diverse missions.
ACTION: Establish of a single centralized Army HM/HW Technology Transfer Manager.

RESPONSIBILITY: ASA(I,L&E), ACE

b. REQUIREMENT: A strategy for implementation is needed at the outset of a research and development project, which may include but is not limited to issue 4, items 1) through 6) on the problem statement to ensure implementation of R&D products.

ACTION: Develop a prototype implementation strategy format for inclusion in the initial research and development project proposal.

RESPONSIBILITY: ACE, MACOMs

c. REQUIREMENT: Follow on support to address problems encountered during implementation and to disburse implementation changes defined during full scale use is required to effectively implement new technologies.

ACTION: Establish a technology implementation "Support

Center" to be the point of contact for solutions to problems that arise when technologies are implemented (similar to the one temporarily established for vehicle washracks). Also, to be the center for technology exchange between other Services and the private sector. Prepare supporting documentation to be included in the Senior Environmental Leadership Conference's action to "Establish an Environmental Policy Institute".

RESPONSIBILITY: ASA(I,L&E), ACE

ISSUE #5

ENVIRONMENTAL EDUCATION AND TRAINING

ISSUE #5 - Environmental Education and Training

Problem Statement: Army personnel generally lack sufficient training in HM/HW management in areas outside their direct expertise. This lack of awareness inhibits efforts to reduce the generation of hazardous waste.

For instance, many workers who use HM do not know the definition or characteristics of HW. Consequently, they add to disposal costs by handling nonhazardous wastes and usable materials as HW. Alternatively, mismanagement of HW may cause danger to health and the environment.

Often, workers whose primary jobs involve HW handling do not have appropriate training to make the correct decisions. By providing additional training, Army managers can reduce and/or eliminate accidents, excessive waste generation, and noncompliance.

Military courses also lack classes on HM/HW management and other environmental concerns. As a result most troops and their leaders are unaware of their responsibilities in these areas or their effect on the generation of HW.

Actions Required:

a. REQUIREMENTS: Train all soldiers in HM/HW principles during Basic Training, Advanced Individual Training, Officers Basic and Advanced Course, NCO development courses, and senior service schools.

ACTION: Prepare training courses and materials for Basic Training, Advanced Individual Training, Officers Basic and Advanced Course, NCO development courses, and senior service schools. Develop and disseminate "Train-the-Trainer" packages and training aides to support all statutory training requirements.

RESPONSIBILITY: TRADOC, CoE, Health Services Command (HSC), DASAF, DCSOPS

b. REQUIREMENT: Train all applicable personnel and develop awareness throughout all AMC installations in HM/HW principles. Also, target the following people for HM/HW training: Forces Command (FORSCOM) and TRADOC direct support (DS) maintenance personnel; range control personnel: logisticians (warehousemen, maintenance, and procurement); Reserve and National Guard maintenance personnel.

ACTION: Either develop in-house training material for the civilian workforce that can be presented by Army personnel at the installation level or identify a training center for people to be sent to.

RESPONSIBILITY: CoE, MACOMs

c. REQUIREMENT: Use a top-down management approach to emphasize environmental and HM/HW concerns among managers. Make environmental training of subordinates a critical performance element for managers.

ACTION: Modify AR 350-1 to add environmental training and environmental compliance to commander's Officer Evaluation Reports (OERs) and to supervisors performance appraisals.

RESPONSIBILITY: DCSPER, DCSOPS, MACOMs, ACE

d. REQUIREMENT: All training should be a coordinated effort among staffs elements.

ACTION: Coordinate training efforts among environmental personnel, industrial hygienists, and safety officers to establish training requirements at installations, MACOMs, etc.

RESPONSIBILITY: ACE, MACOMs

e. REQUIREMENT: Contracting methods are needed for training on installations which have substantial operations (equipment or grounds maintenance) under contract but do not provide avenues to train these contract workers in environmental management.

ACTION: Include a ~~line item~~ requirements clause in contract ~~RFPs~~ solicitations for installation operations (e.g., equipment or grounds maintenance) to require management and worker level HW management training.

RESPONSIBILITY: MACOMs ? How to Do Army-wide

f. REQUIREMENT: General information and awareness need to be increased in the area of HM/HW management.

ACTION: Develop a general awareness campaign similar in scope to the Army Energy Awareness program.

RESPONSIBILITY: Public Affairs Office, Headquarters Department of Army (PAO-HQDA)

ISSUE #6

MATERIAL QUANTIFICATION AND TRACKING

Issue #6 - Material Tracking and Quantification

Problem Statement: Federal Facilities are not currently required to comply with the Community Right to Know Legislation (SARA Title III), but the Army policy is to adhere to the spirit of the legislation to the degree practicable. Some of the requirements of Title III would be of great benefit to the Army in managing hazardous material/hazardous waste, such as requirements to "track" hazardous material on site and to maintain "Mass Balance" data for processes. To comply with the law's intent, the Army is required to keep records of the amounts of hazardous material that went into a process and the amount(s) of hazardous waste that came out of the process. Waste stream identification and measurement is a clear requirement from each hazardous waste generation process.

Industries are currently required to conduct this mass balance on all materials for which a material safety data sheet (MSDS) is required. Their success in meeting these requirements is varied, depending on local pressure and corporate commitment. Industries that make strong commitments have been able to achieve mass balance accounting to >99% of input material.

Currently the Army does not have a standardized definition of hazardous waste. Thus, Environmental Coordinator's reports vary widely on the quantities of hazardous waste being generated, recycled, moved, and disposed of. Some may report only that hazardous waste which goes off the site, and some may report total hazardous waste generated by processes. This often results in "double counting", especially when the hazardous waste is recycled.

Also, the Army does not have an integrated data management system which permits the Environmental Coordinator to identify hazardous materials from the supply side of the Army. Supply, Procurement, and Contracting Offices do not have a unified means of identifying hazardous material as it is procured/ordered. To collect hazardous material statistics, one has to impose an antiquated Department of Transportation freight handling code to materials in an attempt to categorize and flag material which "might" be hazardous.

The Army does not currently have the means to answer questions regarding amount of hazardous material procured (lack of standard definition and identification), and the amount of hazardous waste generated (lack of waste stream identification and sensor monitoring). National Stock Numbers (NSNs) are not specific enough to characterize HM. The Federal Supply Code (FSC) is a 4 digit code used in the SAACONS system as the product code, but it is not as specific as the NSN. HMIS and HMMS track information about HM (e.g., MSDS sheets), but do not track material flow. The lack of hazardous waste identification (e.g., when to start

"counting"), and linking of hazardous waste streams to hazardous waste generating processes is also a problem. It is not possible to link hazardous waste directly to a process because it is disposed off post via the Defense Reutilization and Marketing Office (DRMO) or by Contractor (the hazardous material is thrown together by DRMO and Contractors - thus source generation data is difficult to track).

One of the outgrowths of the lack of standardization has been that a proliferation of data systems and "ways of doing business" (obtaining and reporting information) have come to exist. These systems have come about positively as each Environmental Coordinator is tasked to manage his hazardous material/hazardous waste area. However, there is almost no uniformity between them. It is necessary that everyone obtain and use the same information from the installation to the MACOM to DA.

There is a high potential of substantial payoff from efficient and accurate tracking systems. They allow progress in HAZMIN to be observed and help to rectify problems. They also promote better awareness of the HM/HW problem, leading to reduced Notices of Violation (NOVs). Accurate tracking systems have been identified as a major ingredient to successful HAZMIN plans.

Actions Required:

a. REQUIREMENT: A standardized method of accounting for hazardous waste and hazardous material is needed which can be easily quantified and meet the spirit of maximum reduction in ultimate disposal to the environment.

ACTION: Army activities, in agreement with the Environmental Protection Agency (EPA) and DOD, must make a decision regarding the definition of hazardous waste and hazardous material to determine when HM/HW should be counted for generation and/or disposal data.

RESPONSIBILITY: ACE, MACOMs

b. REQUIREMENT: A simple method to translate EPAs waste codes into layman's terms is needed to improve the accuracy of reporting.

ACTION: Develop a cross reference list for commonly used materials/wastes and EPA waste codes using examples of such generated on installations.

RESPONSIBILITY: CoE, AMC

c. REQUIREMENT: Reports of waste generation by EPA waste code are needed for Army management purposes. Additionally,

integrate State waste and State reporting requirements, if applicable. No current system allows a general roll up of data to the Army level.

ACTION: Report waste generation by EPA waste code up to Army Environmental Office (AEO) on a biennial basis, until the Army management information system is operational. The data source will be the EPA required biennial reports.

RESPONSIBILITY: MACOMs

d. REQUIREMENT: An automated data management system is needed which provides aggregated information to the Environmental Coordinator and higher staff echelons, and generates all Army, Federal, State, Host Nation and Local hazardous material and hazardous waste reporting requirements.

ACTION: The Army must provide an automated data management tool to the Environmental Coordinator which provides aggregated information (for management purposes) to higher staff echelons (Macom, DA, etc.) which addresses the recommendations of the Shatto report (1989).

RESPONSIBILITY: ACE, DCSLOG, MACOMs

e. REQUIREMENT: A high-speed communication network must be installed to support automated, timely reporting and management of hazardous material/hazardous waste, coordinated with the Supply/Procurement side of the Army. This network should be an integrated subset of the "Army Automated Environmental Management Information System" (AAEMIS, mentioned in the Shatto [1989] report). The Army needs to identify hazardous material much earlier in the procurement process and "tag" this material as it is ordered and acquired so that it may be "tracked" and appropriately handled from "cradle-to-grave" through the front door and out the back door of the Army.

ACTION: Interface the management information system described in 6b with the supply/procurement procedures. Data must be accepted at the time of delivery, and the management program should generate tracking and labeling documents for use on post. Evaluate existing systems for possible adaptation.

RESPONSIBILITY: ACE, Defense Logistics Agency (DLA), DCSLOG, MACOMs

f. REQUIREMENT: Existing technology of Bar Coding should be integrated through the Supply/Procurement area and information captured as packaged material is delivered and/or moved. Bar codes should also be developed for generators, and placed on any transportable receptacles. This data should be easily transferred to the management information system.

ACTION: Develop a bar coding system for hazardous materials and hazardous wastes with automatic field readers which can directly download to the management information system described in 6d. Evaluate existing systems for possible adaptation.

RESPONSIBILITY: DCSLOG, CoE, DLA, AMC

g. REQUIREMENT: A central stores warehouse (with adequate HM storage), or an interconnected network of warehouses, is required to control flow of materials on-post. Materials purchased by contractors would also have to pass through a central or networked warehouse, so that all incoming material can be quantified.

ACTION: Establish a central warehouse or electronically interconnected network of warehouses. Require all contractors and tenants to receive materials through the warehouse or network. Interface receiving with hazardous material management information system.

RESPONSIBILITY: DCSLOG, MACOMs

h. REQUIREMENT: Contractors who develop/produce Army components/systems, or operate all or part of an Army facility, and tenant organizations need to incorporate all information on hazardous material/hazardous waste for which they are responsible into the management information system. Contract language needs to be amended for Government Owned/Contractor Operated and Contractor Owned/Contractor Operated facilities such that the contractor's responsibilities regarding the procurement, use, handling, and disposal of hazardous material/hazardous waste material is in accordance with the Army management information system.

ACTION: Provide requirements in RFPs and contracts for the use of the Army management information system, and require that the database be updated periodically and available for Army review.

RESPONSIBILITY: ASA(RDA), AMC, DCSLOG

i. REQUIREMENT: Accurate determination of actual life cycle costs requires the best information on the true fate of the materials in a process. This material mass balance (referred to as "accounting mass balance" in the community right to know) will allow a feedback mechanism for refinement of the cost allocation procedure in the Army Material Assessment Procedure.

ACTION: Develop a material accounting procedure for use with the management information system database which determines

the fate of materials in the process which reside in the product, air, water, sludge, concentrated liquid or solid residue.

RESPONSIBILITY: CoE

ISSUE #7

LIABILITY

Issue #7 - Liability

Problem Statement: Liability is a major concern in the management of hazardous materials and hazardous waste. Liability can be assigned to an individual or organization (e.g., installation, MACOM, or DA). The Army, in its industrial base production and readiness missions, uses many hazardous materials and generates some hazardous wastes. However, there are many options which minimize their use/generation, and an understanding of the liabilities involved will provide added incentive to prevent pollution.

Instruction on the potential liabilities associated with a specific action is needed for Army personnel, civilian employees, and contractors/tenant activities. Although similar to the type of instruction associated with proper use, instruction on liability should contain information on penalties for improper use, similar to the "Penalty for Private Use, $300" seen on all Official Business correspondence. Such information could be contained in posters for use areas (such as self-help auto repair, workshops in family housing quarters, etc.) as well as courses in management and procurement. (The Water Pollution Control Federation produces a poster which lists commonly used materials, and their safe disposal, which could serve as an example).

Decisions regarding HM/HW management must consider liability from the policy level down. For example, a decision to implement on-post recycling of hazardous materials to the greatest extent possible may require longer waste storage time, greater waste handling, and the operation of a sophisticated process subject to breakdown, spillage, etc. All of these operations increase the potential liability, and these considerations must be included in any analysis which recommends a specific process implementation.

Although the Army is ultimately responsible for HM/HW, liabilities due to negligence on the part of contractors and tenant activities which are borne by other staff at installations (including Government Owned, Government Operated [GOGO], Government Owned, Contractor Operated [GOCO] and Contractor Owned, Contractor Operated [COCO]) need to be better defined.

Implementation of better tracking systems can have a positive or negative effect on liability. The tracking systems will be a source of detailed information which could be used against the Army if a problem arises, which could be viewed as an increased liability. The tracking systems could similarly be used to defend the Army in cases where nebulous allegations are unjustified in fact, thereby reducing liability. Problems with computerized systems are most prominent during the transition from development to implementation, when "the bugs are being worked out". Therefore, until tracking systems are fully imple-

protected ? discuss with legal

mented and field verified, ~~they must be shielded from public scrutiny and prohibited~~ from use in litigation, because a "bug" in a tracking system program could indicate apparent mismanagement where no problem really exists.

Lastly, the dynamic nature of environmental laws and regulations establishes the need for a centralized information exchange to maintain knowledge of the current status of federal, state, host nation and local statutes. This information exchange mechanism should report to the field on impending and implemented statutes which affect the liability for use of HM/HW.

Actions Required:

a. REQUIREMENT: Develop course material and material specific instructions on liability and responsibility for civilian and Army personnel (including implications of GOGO, GOCO and COCO installations) for inclusion in training courses and containers of hazardous materials. OK

ACTION: Integrate information on the issue of liability into training courses on hazardous materials management developed under Issue 5, Actions A and B. Develop environmental liability warning statement to be included in block 7, Specific Hazards and Precautions section, of DD Form 2521 and 2522, Hazardous Chemical Warning Label. Consider integrating the liability stickers into the barcode application system.

RESPONSIBILITY: The Judge Advocate General (TJAG), CoE, DASAF, DCSLOG

b. REQUIREMENT: Instructions on safe use and cautions about potential liabilities from misuse are needed at the point of use for the workforce, and at places in which hazardous materials are used.

ACTION: Develop a poster campaign to caution about potential liability for misuse to be located throughout work areas, self-help areas and possibly workshops/garages in family housing areas.

RESPONSIBILITY: HQDA, PAO

c. REQUIREMENT: Process engineers and environmental coordinators need access to information on the liability associated with HM/HW storage, handling, use, and transport.

ACTION: Establish a committee of legal expertise on HM/HW liability to participate in the Material Assessment Procedure. Designate a responsible party and establish a telephone hotline.

RESPONSIBILITY: TJAG

d. REQUIREMENT: Operating personnel, both civilian and military, need up to date knowledge of environmental statutes and their interpretation by regulatory agencies and the courts.

ACTION: Establish a committee of legal expertise to review statutes and court actions, and to report to field operating personnel via regular publications such as "USATHAMA Environmental Update" and EHSC's "DEH Digest".

RESPONSIBILITY: TJAG, ACE

e. REQUIREMENT: Tracking system information must be considered experimental only prior to the full test, evaluation and calibration (for material fate estimates).

ACTION: Establish a policy of release of tracking system information only after system calibrations and testing has been completed.

RESPONSIBILITY: DCSLOG, TJAG, ACE add General Counsel

ISSUE #8

CENTRALIZED COORDINATION OF EFFORT

Issue #8 - Centralized Coordination of Effort

Problem Statement: The current Army effort to manage HM/HW is fragmented and uncoordinated. No single organization is charged with the mission of directing HM/HW management efforts for the total Army, in all required areas, such as research and development, acquisition, procurement, production and life-cycle maintenance.

With conception and execution of HM/HW management initiatives decentralized to each MACOM, a number of parallel efforts are currently underway with a resultant waste of scarce resources.

Actions Required:

a. REQUIREMENT: Identify an office at the DA-level to centrally manage implementation of HM/HW management activities throughout the Army.

ACTION: Designate a DA level office to provide overall coordination and Army guidance and an implementation organization to coordinate individual actions and manage funding.

RESPONSIBILITY: ASA(I,L&E), ASA(RDA).

b. REQUIREMENT: Establish clear policy guidance and identify lead agencies for development and implementation of HM/HW initiatives for all aspects of Army operations, including production, acquisition, maintenance and installation operations.

ACTION: Prepare guidance identifying each major organization/program in HM/HW operations (USATHAMA, MANTECH, DESCOM, etc.), the scope of their operations and the framework for interaction.

RESPONSIBILITY: ASA(RDA), CoE, DCSLOG

ISSUE #9

COMMAND EMPHASIS

ACTION: Have the Army Chief-of-Staff send "personal for" messages to all MACOM Installation Commanders identifying the Army's goals, objectives, and issues and directing them to emphasize the environmental program.

RESPONSIBILITY: CoE

c. REQUIREMENT: Installation commanders need to be made aware of the criminal and civil liability they and their civilian staffs face in the environmental field.

ACTION: Have the Judge Advocate General (TJAG) send letters to all installation commanders detailing their HW management responsibilities from a legal perspective and their relationship with the Staff Judge Advocate.

RESPONSIBILITY: TJAG

ISSUE #10

MULTI-FUNCTIONAL EFFORT

Issue Item #10 - Multi-Functional Effort

Problem Statement: HM/HW management is more than just an environmental issue; non-environmental/multi-functional efforts should be combined to effectively manage these items. The current perception of HM/HW is that it is solely an environmental office problem. Since waste management is regulated by both the Army and Federal/state environmental regulations, the perception is understandable. However, complying with these regulations impacts on more than just the environment. Any generator of hazardous wastes is responsible for that waste from "cradle to grave" and that responsibility carries with it a large burden.

Acquisition offices seek to trade-off performance, cost and schedule with little input on environmental considerations. Procurement offices seek to only minimize their cost of materials. Logistics and Production people seek to only minimize the cost of manufacturing and support (supply and maintenance). Disposal people seek to only minimize the cost of storage, reutilization, treatment, and disposal. But in the present system no one seeks to minimize the overall cost of use of a material and its resulting waste.

Actions Required:

a. REQUIREMENT: At the installation and MACOM levels the decision makers who identify what to buy, what to use, and how to dispose must become a team to determine the true life-cycle cost of materials and processes.

ACTION: Make it a mission of the installation and MACOM Environmental Quality Control Council (EQCC) to identify incoming HM and its life-cycle cost to the Army. Also, make it the mission of the EQCC to determine alternatives to the status quo and institute the best alternative.

RESPONSIBILITY: CoE, MACOMS

b. REQUIREMENT: If the EQCC mission identified in Issue 10a is to work all members should be trained in environmental awareness.

ACTION: Provide EQCC members with environmental management training. Prepare a training program for this group that emphasizes life-cycle costs, liabilities, and HM/HW management.

RESPONSIBILITY: CoE, TRADOC

c. REQUIREMENT: Installation Hazardous Waste Management Plans and Hazardous Waste Minimization Plans will be affected by

several aspects of this management plan, and need to be updated to reflect changes which are proposed (e.g., tracking systems, material balances, training, etc.), and changing environmental laws.

ACTION: Update installation Hazardous Waste Management Plans and Hazardous Waste Minimization Plans to include all functional areas and their responsibilities.

RESPONSIBILITY: MACOMs

d. REQUIREMENT: PEOs and PMs need to establish the technical issues attendant with environmental acceptability as a portion of a weapon system program's concurrent engineering efforts.

ACTION: Institutionalize the establishment of technical issues attendant with environmental acceptability as a portion of a weapon system program's concurrent engineering efforts in the PEO/PM guidance/requirements such as the Program Baseline Document, RFP and Production Readiness Master Plan (PRMP).

RESPONSIBILITY: ASA(RDA), AMC

ISSUE #11

ENVIRONMENTAL STAFFING AND ORGANIZATION

Issue #11: Environmental Staffing and Organization

Problem Statement: Army environmental staffs are not adequate to achieve and maintain compliance.

In most cases, installations have two or three people in charge of executing more than a dozen major environmental programs. Many environmental staffs lack technical backgrounds and training in environmental regulations. In contrast, large environmental staffs usually have too many professionals. Installations need enough technicians and clerks to fulfill record keeping, inspecting, and other routine requirements.

The Army has trouble attracting experienced and qualified environmental personnel because of constraints (e.g., hiring freezes, lack of career path) in the personnel system. One of the major problems is that the Army does not offer adequate compensation. Installation environmental coordinators are usually classified as GS-11's or GS-12's. Salaries at these levels cannot compete with those offered by industry, which are up to 25% higher (Minton, B., Federal Times). The gap between Army and private environmental salaries is greatest in high-cost areas and is growing as the demand for environmental professionals increases.

Further, at installations and MACOMs, environmental staffs are usually buried within engineer organizations. Such placement gives environmental coordinators a voice in many maintenance and installation support functions that impact the environment. On the other hand, many environmental problems arise from logistics and mission activities. Engineer environmental organizations have little authority over logistics and mission elements.

Army environmental staffs need greater numbers, better training, greater incentives for recruiting and retention, and more authority at installations and MACOMs.

Actions Required:

a. REQUIREMENT: Environmental Offices need the authority to effect more than just maintenance and installation support functions.

ACTION: Structure environmental staffs to give them authority over or maneuverability among operational and support elements. Staffs must be able to coordinate activities among engineering, logistics, contracting, and operations.

RESPONSIBILITY: CoE, MACOMs, DCSPER

b. REQUIREMENT: Many aspects of environmental compliance involve routine work and record keeping. Having too many engineers or chemists on a staff can hinder record keeping and inflate the bureaucracy. A balanced number of professionals, technicians, and clerks is needed on environmental staffs.

ACTION: Develop an environmental staffing guide.

RESPONSIBILITY: CoE, DCSPER

c. REQUIREMENT: The balance of personnel in the environmental office is important but not as important as having a sufficient number of personnel to effectively manage the job.

ACTION: Recommend increased authorizations for environmental positions on installation and MACOM TDAs.

RESPONSIBILITY: CoE, DCSPER

d. REQUIREMENT: Long term and effective environmental compliance cannot be achieved if corporate memory is not retained.

ACTION: recommend an increase in salaries and grading to make positions competitive with industry, and establish a career path for environmental professionals.

RESPONSIBILITY: ASA(I,L&E), DCSPER, CoE

e. REQUIREMENT: Environmental considerations need to be as important as health and safety considerations during periods of constrained personnel accessions.

ACTION: Provide variances for critical positions on environmental staffs at all levels.

RESPONSIBILITY: DCSPER, CoE

ISSUE #12

REVIEW AND UPDATE OF MILITARY SPECIFICATIONS AND PROCEDURES

Issue Item #12 - Review and Update of Military Specifications and Procedures

Problem Statement: Many of the Military Specifications (mil-specs) and depot maintenance work requirements (DMWRS) were written many years ago before the effects of chemicals on the environment became an issue. But, because they were written and have not been reviewed with an eye toward the environment chemicals are used and work conducted which forces the user to risk if not endanger human health and the environment.

Actions Required:

a. REQUIREMENT: Change present manuals and requirements to allow alternatives to the use of HM.

ACTION: All mil-specs, DMWRS, Technical Manuals, and Army Regulations where the Army is the lead standardization agency must be reviewed and updated to identify specifications that require HM to be used and to change these items to require less hazardous or non-hazardous substitutes or to allow alternative substances and practices in the performance of the work.

RESPONSIBILITY: ASA(RDA), ASA(I,L&E), MACOMs, DCSLOG

b. REQUIREMENT: The current Hazardous Materials Information System (HMIS) is incomplete and needs to be updated with new Material Safety Data Sheets (MSDS) where there are changes or additions.

ACTION: Establish a mechanism for update of the HMIS with new or modified MSDSs as products are introduced or changed. Execute an initial complete update and revise as more MSDSs are provided.

RESPONSIBILITY: ASA(RDA), AMC, DCSLOG, OTSG, DASAF

ISSUE #13

ENVIRONMENTAL CONTROL COMMITTEE, MISSION AND AUTHORITY

Issue Item #13 - Environmental Quality Control Committee, Mission and Authority

Problem Statement: Installations are required to have an informal Hazardous Waste Management Board by AR 420-47. The revised version of AR 200-1 (23 Apr 90), which in its current form will supercede AR 420-47 in this matter, requires an Environmental Quality Control Committee. The charge of the committee is "act on the broad range of environmental issues covered in" AR 200-1. The committee "advises the Installation Commander on environmental priorities, policies, strategies and programs."

Although this committee is yet to be established, the experience from the informal Hazardous Waste Management Board indicates that little command emphasis accompanies it, except in reactive modes when a problem occurs. The revised AR 200-1 proposes a meeting of the Committee on a monthly basis, but maintains it as an advisory board, with no specific authority or mission to interact and coordinate with other groups.

Actions Required:

a. REQUIREMENT: The Authority and Mission of the existing Hazardous Waste Management Board, or the proposed Environmental Quality Control Committee, should be expanded. One new major mission would be the review and approval for purchase of materials coming on-post. Review and approval would consist of estimating the environmental fate (product, air, water, concentrated spent liquid or solid, or sludge) of each material, estimate the cost of treatment or disposal arising from each media, and assigning that cost to the process.

ACTION: Assign the EQCC, whose core members are noted in Issue 10, the mission of providing Material Assessment for the Army, with the authority to assign these costs to bids during the review process, as described under Issue 3 and approve purchases. This committee will contain the expertise of production personnel, environmental, safety, etc., as described in the revised AR 200-1. Approval for purchase would allow the material to be brought into central stores.

RESPONSIBILITY: MACOMs, CoE

b. REQUIREMENT: Approval for purchase is only one step in releasing the material for use on the installation. The second step is ensuring that the material will be used as proposed. For example, a solvent could be used for degreasing, paint removal, etc., and it could be used in several modes, i.e., dip tank, spray booth, etc., with dramatic variability in environmental cost depending on the specific method in which it would be used.

ACTION: Assign the EQCC the mission of defining how materials can be used on post. Before the material is released from central stores, the committee would ensure that the material was being used as proposed, that proper equipment and controls were available, etc. The use of such committee review would be phased in, along with material tracking and quantification, starting with the five largest material flow streams and followed by the next five largest material flow streams, each six months until all hazardous materials came under committee review.

RESPONSIBILITY: CoE, MACOMs, DCSOPS

c. REQUIREMENT: Assigning missions to the EQCC as described in Issue 13a and 13b will require modifications to current wording and authority in AR 200-1.

ACTION: Develop supplemental instruction to establish the missions described in Issues 13a and 13b in the EQCC.

RESPONSIBILITY: MACOMs

d. REQUIREMENT: The EQCC may be required to meet state regulations which vary from federal regulations (e.g., handling of waste oil varies state to state). This requires coordination with the state, and will be aided by coordination with other federal facilities under the same unique state requirements.

ACTION: EQCC's should coordinate with state regulatory agencies, and with other Army installations in that state, to develop compliance strategies and coordinate actions of mutual interest which are unique to that state.

RESPONSIBILITY: CoE, MACOMs

V MILESTONE SCHEDULE

The following is a list of actions required by each agency to meet the goals of this plan. For each action, there is a lead agency. For many of the actions, there is a major contributing agency or agencies which will provide input to the lead agency. The milestones are in months and years after plan acceptance and authorization. Actions are numbered in the same manner as in Section IV, for reference purposes.

Actions are repeated herein wherever there is a lead or contributing agency. The purpose of listing the actions as such is to facilitate identification of actions by agency rather than issue. Actions for which the agency has the lead are listed in order of Milestone Date (ascending order), and those with the same date are listed by order of appearance in Section IV. After lead Actions are listed, all Actions for which the agency is a contributor are listed, again by Milestone Date and order of appearance in Section IV.

For reference, Appendix A is a listing of acronyms and abbreviations used in this plan, and Appendix B is a graphic presentation of the schedule.

Army Materiel Command

The Army Materiel Command does not have the lead on any action, but is a contributing agency on 14 actions.

Contributing on Action 1a: Review operational requirements documentation, identify uses of hazardous material, compare proven alternatives, and propose revisions for proponent review. Establish policy which institutionalizes the issue of minimizing the use of HM in operational requirements for future systems.

Milestone Date: 6 months

Lead Agency: CoE

Contributing on Action 1f: Provide funds for system and product Research and Development (R&D) personnel, maintenance personnel, and production personnel to complete training required under:

1) Department of Transportation (49 CFR 173-177),

2) Occupational Safety and Health Administration (29 CFR 1910.1200),

3) Resource Conservation and Recovery Act (40 CFR 264.16 and 265.16),

4) Superfund Amendments and Reauthorization Act Title III,

as if they were operating a production facility. Provide funds to develop courses on Army developed HAZMIN and tracking/quantification procedures and require instruction on these to same personnel.

Milestone Date: 1 year

Lead Agency: ACE

Contributing on Action 6b: Develop a cross reference list for commonly used materials/wastes and EPA waste codes using examples of such generated on installations.

Milestone Date: 1 year

Lead Agency: CoE

Contributing on Action 10d: Institutionalize the establishment of technical issues attendant with environmental acceptability as a portion of a weapon system program's concurrent engineering efforts in the PEO/PM guidance/requirements such as the Program Baseline Document, RFP and Production Readiness

Master Plan (PRMP).

Milestone Date: 1 year

Lead Agency: ASA(RDA)

Contributing on Action 12b: Establish a mechanism for update of the HMIS with new or modified MSDSs as products are introduced or changed. Execute an initial complete update and revise as more MSDSs are provided.

Milestone Date: 1 year

Lead Agency: ASA(RDA)

Contributing on Action 1j: Establish multi-disciplinary team of expertise in system acquisition, design, environmental and industrial engineering, and safety for source selection evaluation to proactively assist the PM/PEO's and other managers of new equipment and perform an independent (i.e., third party) review and assessment of the programs prior to major milestones (Defense Acquisition Board, Army Systems Acquisition Review Council, In-Process Review).

Milestone Date: 1.5 years

Lead Agency: ASA(RDA)

Contributing on Action 1b: Develop an Army Materials Assessment Procedure which addresses material fate and projected treatment and disposal costs. Initial costs will be based on estimates of the fates of materials (to air, water, solid, sludge, etc.), and later refined by material mass balances derived from the material tracking and quantification system.

Milestone Date: 2 years

Lead Agency: ACE

Contributing on Action 1d: Provide a description of the Material Assessment Procedure within the Request For Proposal (RFP). Require a list of alternatives considered and results determined. Utilize Best Value/Quality of the item/system above the lowest bid.

Milestone Date: 2 years

Lead Agency: ASA(RDA)

Contributing on Action 1e: Select a committee of personnel representing weapons system acquisition, design, environmental considerations, industrial engineering and safety; train them in

the Material Assessment Procedure for use in source selection, and risk assessment for handling/use/storage of HM.

Milestone Date: 2 years

Lead Agency: ASA(RDA)

Contributing on Action 1g: Adopt revisions to Army acquisition regulations anticipated under SARDA Study I. Pass request through DA to DOD or other appropriate agency for regulations which are under control of other Federal agencies, including a description of the revisions used in SARDA Study I.

Milestone Date: 2 years

Lead Agency: ASA(RDA)

Contributing on Action 1h: The Program Manager/Program Executive Office (PM/PEO) will include program requirements and resources in his program master plans such as the Integrated Logistics Support Plan (for Logistics aspects such as maintenance), the Test and Evaluation Master Plan (for evaluation of alternative substances), the Production Readiness Master Plan (for alternate manufacture and materials/processes) System Safety Program Plan and System Manpower and Integration Plan.

Milestone Date: 2 years

Lead Agency: ASA(RDA)

Contributing on Action 6f: Develop a bar coding system for hazardous materials and hazardous wastes with automatic field readers which can directly download to the management information system described in 6d.

Milestone Date: 2 years

Lead Agency: DCSLOG

Contributing on Action 6h: Provide requirements in RFPs and contracts for the use of the Army management information system, and require that the database be updated periodically and available for Army review.

Milestone Date: 2.5 years

Lead Agency: ASA(RDA)

Contributing on Action 1c: Require contractors, as part of their proposals, to 1) identify all HM/HW to be used or produced and estimate volume and cost for disposal; 2) require identification and evaluation of alternatives which will reduce volume or toxicity of wastes; and 3) submit written evaluation of residual material fate using the Army Material Assessment Procedure, for all hazardous materials proposed for use. Review these inputs at source selection evaluation.

Milestone Date: 3 years

Lead Agency: ASA(RDA)

Assistant Chief of Engineers

The Assistant Chief of Engineers has the lead on the following eight (8) actions, and is a contributing agency on seven (7) actions.

Action 6a: Army activities, in agreement with the Environmental Protection Agency (EPA) and DOD, must make a decision regarding the definition of hazardous waste and hazardous material so that it can accurately report and manage these materials.

Milestone Date: 6 months

Contributing Agencies: MACOMs

Action 1f: Provide funds to develop courses on Army developed HAZMIN and tracking/quantification procedures and require instruction on these to same personnel. Provide funds for system and product Research and Development (R&D) personnel, maintenance personnel, and production personnel to complete training required under:

1) Department of Transportation (49 CFR 173-177),

2) Occupational Safety and Health Administration (29 CFR 1910.1200),

3) Resource Conservation and Recovery Act (40 CFR 264.16 and 265.16),

4) Superfund Amendments and Reauthorization Act Title III,

Milestone Date: 1 year

Contributing Agencies: DCSPER, AMC, ASA(RDA), DASAF

Action 4b: Develop a prototype implementation strategy format for inclusion in the initial research and development project proposal.

Milestone Date: 1 year

Contributing Agencies: MACOMs

Action 5d: Coordinate training efforts among environmental personnel, industrial hygienists, and safety officers to establish training requirements at installations, MACOMs, etc.

Milestone Date: 1 year

Contributing Agencies: MACOMs

Action 6d: The Army must provide an automated data management tool to the Environmental Coordinator which provides aggregated information (for management purposes) to higher staff echelons (Macom, DA, etc.) which addresses the recommendations of the Shatto report (1989).

Milestone Date: 1 year

Contributing Agencies: DCSLOG, MACOMs

Action 6e: Interface the management information system described in 6b with the supply/procurement procedures. Data must be accepted at the time of delivery, and the management program should generate tracking and labeling documents for use on post.

Milestone Date: 1.5 years

Contributing Agencies: DLA, DCSLOG, MACOMs

Action 1b: Develop an Army Materials Assessment Procedure which addresses material fate and projected treatment and disposal costs. Initial costs will be based on estimates of the fates of materials (to air, water, solid, sludge, etc.), and later refined by material mass balances derived from the material tracking and quantification system.

Milestone Date: 2 years

Contributing Agencies: AMC, DCSLOG, DASAF

Action 1i: Develop a risk premium calculation method and add that premium to all bids before selection. Alternatively, bids not containing materials hazardous to the environment could be assigned a high weighting in selection.

Milestone Date: 2.5 years

Contributing Agencies: MACOMs, DASAF, OTSG

Contributing on Action 4a: Establish of a single centralized Army HM/HW Technology Transfer Manager.

Milestone Date: 6 months

Lead Agency: ASA(I,L&E)

Contributing on Action 5c: Modify AR 350-1 to add environmental training and environmental compliance to commander's Officer Evaluation Reports (OERs) and to supervisors performance appraisals.

Milestone Date: 1 year

Lead Agency: DCSPER

Contributing on Action 7d: Establish a committee of legal expertise to review statutes and court actions, and to report to field operating personnel via regular publications such as "USATHAMA Environmental Update" and EHSC's "DEH Digest".

Milestone Date: 1 year

Lead Agency: TJAG

Contributing on Action 7e: Establish a policy of release of tracking system information only after system calibrations and testing has been completed.

Milestone Date: 1 year

Lead Agency: DCSLOG

Contributing on Action 1j: Establish multi-disciplinary team of expertise in system acquisition, design, environmental and industrial engineering, and safety for source selection evaluation to proactively assist the PM/PEO's and other managers of new equipment and perform an independent (i.e., third party) review and assessment of the programs prior to major milestones (Defense Acquisition Board, Army Systems Acquisition Review Council, In-Process Review).

Milestone Date: 1.5 years

Lead Agency: ASA(RDA)

Contributing on Action 4c: Establish a technology implementation "Support Center" to be the point of contact for solutions to problems that arise when technologies are implemented (similar to the one temporarily established for vehicle washracks). Also, to be the center for technology exchange between other Services and the private sector. Prepare supporting documentation to be included in the Senior Environmental Leadership Conference's action to "Establish an Environmental Policy Institute".

Milestone Date: 1.5 years

Lead Agency: ASA(I,L&E)

Contributing on Action 1e: Select a committee of personnel representing weapons system acquisition, design, environmental considerations, industrial engineering and safety; train them in the Material Assessment Procedure for use in source selection, and risk assessment for handling/use/storage of HM.

Milestone Date: 2 years

Lead Agency: ASA(RDA)

Assistant Secretary of the Army (Financial Management)

The Assistant Secretary of the Army (Financial Management) has the lead on two (2) actions but is not a contributing agency on any action.

Action 2a: Establish AMS codes for environmental program elements. HM/HW Management and HAZMIN projects should be independently flagged. AMS coding should be consistent with the needs and priorities identified in the RCS:1383 Report.

Milestone Date: 1 year

Contributing Agency: ASA(I,L&E)

Action 2b: Identify the structure and requirements for an MCA buyout program similar to that used for Child Development Centers (in which MCA funds could be reprogrammed by installations to accelerate CDC construction ahead of other planned projects).

Milestone Date: 2 years

Contributing Agencies: None

Assistant Secretary of the Army (Installations, Logistics, and Environment)

The Assistant Secretary of the Army (Installations, Logistics, and Environment) has the lead on the following five (5) actions, and is a contributing agency on two (2) actions.

Action 4a: Establish of a single centralized Army HM/HW Technology Transfer Manager.

Milestone Date: 6 months

Contributing Agency: ACE

Action 8a: Designate a DA level office to provide overall coordination and Army guidance and an implementation organization to coordinate individual actions and manage funding.

Milestone Date: 6 months

Contributing Agency: ASA(RDA).

Action 4c: Establish a technology implementation "Support Center" to be the point of contact for solutions to problems that arise when technologies are implemented (similar to the one temporarily established for vehicle washracks). Also, to be the center for technology exchange between other Services and the private sector. Prepare supporting documentation to be included in the Senior Environmental Leadership Conference's action to "Establish an Environmental Policy Institute".

Milestone Date: 1.5 years

Contributing Agency: ACE

Action 11c: Increase authorizations for environmental positions on installation and MACOM TDAs.

Milestone Date: 2 years

Contributing Agencies: CoE, DCSPER

Action 11d: Make salaries and grading more competitive with industry, and establish a career path for environmental professionals.

Milestone Date: 2 years

Contributing Agencies: DCSPER, CoE

Contributing on Action 12a: All mil-specs, DMWRS, Technical Manuals, and Army Regulations where the Army is the lead standardization agency must be reviewed and updated to identify specifications that require HM to be used and to change these items to require less hazardous or non-hazardous substitutes or to allow alternative substances and practices in the performance of the work.

Milestone Date: Initiate at 6 months, then continue until all documents have been reviewed.

Lead Agency: ASA(RDA)

Contributing on Action 2a: Establish AMS codes for environmental program elements. HM/HW Management and HAZMIN projects should be independently flagged. AMS coding should be consistent with the needs and priorities identified in the RCS:1383 Report.

Milestone Date: 1 year

Lead Agency: ASA(FM)

Assistant Secretary of the Army (Research, Development and Acquisition)

The Assistant Secretary of the Army (Research, Development and Acquisition) has the lead on the following 11 actions, and is a contributing agency on three (3) actions.

Action 12a: All mil-specs, DMWRS, Technical Manuals, and Army Regulations where the Army is the lead standardization agency must be reviewed and updated to identify specifications that require HM to be used and to change these items to require less hazardous or non-hazardous substitutes or to allow alternative substances and practices in the performance of the work.

Milestone Date: Initiate at 6 months, then continue until all documents have been reviewed.

Contributing Agencies: ASA(I,L&E), MACOMs, DCSLOG

Action 10d: Institutionalize the establishment of technical issues attendant with environmental acceptability as a portion of a weapon system program's concurrent engineering efforts in the PEO/PM guidance/requirements such as the Program Baseline Document, RFP and Production Readiness Master Plan (PRMP).

Milestone Date: 1 year

Contributing Agency: AMC

Action 12b: Establish a mechanism for update of the HMIS with new or modified MSDSs as products are introduced or changed. Execute an initial complete update and revise as more MSDSs are provided.

Milestone Date: 1 year

Contributing Agencies: AMC, DCSLOG, OTSG, DASAF

Action 1j: Establish multi-disciplinary team of expertise in system acquisition, design, environmental and industrial engineering, and safety for source selection evaluation to proactively assist the PM/PEO's and other managers of new equipment and perform an independent (i.e., third party) review and assessment of the programs prior to major milestones (Defense Acquisition Board, Army Systems Acquisition Review Council, In-Process Review).

Milestone Date: 1.5 years

Contributing Agencies: AMC, ACE, OTSG, DASAF

Action 8b: Prepare guidance identifying each major organization/program in HM/HW operations (USATHAMA, MANTECH, DESCOM, etc.), the scope of their operations and the framework for interaction.

Milestone Date: 1.5 years

Contributing Agencies: CoE, DCSLOG

Action 1d: Provide a description of the Material Assessment Procedure within the Request For Proposal (RFP). Require a list of alternatives considered and results determined. Utilize Best Value/Quality of the item/system above the lowest bid.

Milestone Date: 2 years

Contributing Agencies: AMC, DASAF

Action 1e: Select a committee of personnel representing weapons system acquisition, design, environmental considerations, industrial engineering and safety; train them in the Material Assessment Procedure for use in source selection, and risk assessment for handling/use/storage of HM.

Milestone Date: 2 years

Contributing Agencies: AMC, ACE, OTSG, DASAF

Action 1g: Adopt revisions to Army acquisition regulations anticipated under SARDA Study I. Pass request through DA to DOD or other appropriate agency for regulations which are under control of other Federal agencies, including a description of the revisions used in SARDA Study I.

Milestone Date: 2 years

Contributing Agencies: AMC, TRADOC, DCSLOG

Action 1h: The Program Manager/Program Executive Office (PM/PEO) will include program requirements and resources in his program master plans such as the Integrated Logistics Support Plan (for Logistics aspects such as maintenance), the Test and Evaluation Master Plan (for evaluation of alternative substances), the Production Readiness Master Plan (for alternate manufacture and materials/processes) System Safety Program Plan and System Manpower and Integration Plan.

Milestone Date: 2 years

Contributing Agencies: AMC, DCSLOG

Action 6h: Provide requirements in RFPs and contracts for the use of the Army management information system, and require that the database be updated periodically and available for Army review.

Milestone Date: 2.5 years

Contributing Agencies: AMC, DCSLOG

Action 1c: Require contractors, as part of their proposals, to 1) identify all HM/HW to be used or produced and estimate volume and cost for disposal; 2) require identification and evaluation of alternatives which will reduce volume or toxicity of wastes; and, 3) submit written evaluation of residual material fate using the Army Material Assessment Procedure, for all hazardous materials proposed for use. Review these inputs at source selection evaluation.

Milestone Date: 3 years

Contributing Agency: AMC

Contributing on Action 8a: Designate a DA level office to provide overall coordination and Army guidance and an implementation organization to coordinate individual actions and manage funding.

Milestone Date: 6 months

Lead Agency: ASA(I,L&E)

Contributing on Action 1f: Provide funds to develop courses on Army developed HAZMIN and tracking/quantification procedures and require instruction on these to same personnel. Provide funds for system and product Research and Development (R&D) personnel, maintenance personnel, and production personnel to complete training required under:

1) Department of Transportation (49 CFR 173-177),

2) Occupational Safety and Health Administration (29 CFR 1910.1200),

3) Resource Conservation and Recovery Act (40 CFR 264.16 and 265.16),

4) Superfund Amendments and Reauthorization Act Title III.

Milestone Date: 1 year

Lead Agency: ACE

Contributing on Action 3a: Provide the Army Material Assessment Procedure to all bidders on a contract, and require them to perform this assessment on their product to produce the bid. Provide estimates of material fate for the process to the bidders. Review the method calculation as part of bid evaluation and assign the proper calculated cost for an overall bid. This extends the Material Assessment Procedure required for PMs/PEOs in systems acquisition to all contracts including those for off-the-shelf items.

Milestone Date: 2.5 years

Lead Agencies: MACOMs

Chief of Engineers

The Chief of Engineers has the lead on the following 12 actions, and is a contributing agency on 8 actions.

Action 1a: Review operational requirements documentation, identify uses of hazardous material, compare proven alternatives, and propose revisions for proponent review. Establish policy which institutionalizes the issue of minimizing the use of HM in operational requirements for future systems.

Milestone Date: 6 months

Contributing Agencies: DCSOPS, TRADOC, AMC, DASAF

Action 9a: Revise installation organization Army Regulation (AR 5-3) to move the environmental office to a level representative of the partnership between ASA(RDA), ACE and DCSLOG.

Milestone Date: 6 months

Contributing Agencies: MACOMs

Action 9b: Have the Army Chief-of-Staff send "personal for" messages to all Installation Commanders identifying the Army's goals, objectives, and issues and directing them to emphasize the environmental program.

Milestone Date: 6 months

Contributing Agencies: None

Action 6b: Develop a cross reference list for commonly used materials/wastes and EPA waste codes using examples of such generated on installations.

Milestone Date: 1 year

Contributing Agency: AMC

Action 10b: Provide EQCC members with environmental management training. Prepare a training program for this group that emphasizes life-cycle costs, liabilities, and HM/HW management.

Milestone Date: 1 year

Contributing Agency: TRADOC

Action 11a: Structure environmental staffs to give them authority over or maneuverability among operational and support elements. Staffs must be able to coordinate activities among engineering, logistics, contracting, and operations.

Milestone Date: 1 year

Contributing Agencies: MACOMs, DCSPER

Action 13d: The Environmental Quality Control Council (EQCC) should coordinate with state regulatory agencies, and with other Army installations in that state, to develop compliance strategies and coordinate actions of mutual interest which are unique to that state.

Milestone Date: 1 year

Contributing Agencies: MACOMs

Action 10a: Make it a mission of the installation and MACOM EQCC to identify incoming HM and its life-cycle cost to the Army. Also, make it the mission of the EQCC to determine alternatives to the status quo and institute the best alternative.

Milestone Date: 1.5 years

Contributing Agencies: MACOMs

Action 11b: Develop an environmental staffing guide.

Milestone Date: 1.5 years

Contributing Agency: DCSPER

Action 5b: Either develop in-house training material for the civilian workforce that can be presented by Army personnel at the installation level or identify a training center for people to be sent to.

Milestone Date: 2 years

Contributing Agencies: MACOMs

Action 6i: Develop a material accounting procedure for use with the management information system database which determines the fate of materials in the process which reside in the product, air, water, sludge, concentrated liquid or solid residue.

Milestone Date: 2 years

Contributing Agencies: None

Action 13b: Assign the EQCC the mission of defining how materials can be used on post. Before the material is released from central stores, the committee would ensure that the material was being used as proposed, that proper equipment and controls

were available, etc. The use of such committee review would be phased in, along with material tracking and quantification, starting with the five largest material flow streams and followed by the next five largest material flow streams, each six months until all hazardous materials came under committee review.

Milestone Date: 2.5 Years

Contributing Agencies: MACOMs, DCSOPS

Contributing on Action 11e: Provide variances for critical positions on environmental staffs at all levels.

Milestone Date: 6 months

Lead Agency: DCSPER

Contributing on Action 7a: Integrate information on the issue of liability into training courses on hazardous materials management developed under Issue 5, Actions A and B. Develop environmental liability warning statement to be included in block 7, Specific Hazards and Precautions section, of DD Form 2521 and 2522, Hazardous Chemical Warning Label. Consider integrating the liability stickers into the barcode application system.

Milestone Date: 1.5 Years

Lead Agency: TJAG

Contributing on Action 8b: Prepare guidance identifying each major organization/program in HM/HW operations (USATHAMA, MANTECH, DESCOM, etc.), the scope of their operations and the framework for interaction.

Milestone Date: 1.5 years

Lead Agency: ASA(RDA)

Contributing on Action 5a: Prepare training courses and materials for Basic Training, Advanced Individual Training, Officers Basic and Advanced Course, NCO development courses, and senior service schools. Develop and disseminate "Train-the-Trainer" packages and training aides to support all statutory training requirements.

Milestone Date: 2 years

Lead Agency: TRADOC

Contributing on Action 6f: Develop a bar coding system for hazardous materials and hazardous wastes with automatic field readers which can directly download to the management information

system described in 6d.

Milestone Date: 2 years

Lead Agency: DCSLOG

Contributing on Action 11c: Increase authorizations for environmental positions on installation and MACOM TDAs.

Milestone Date: 2 years

Lead Agency: ASA(I,L&E)

Contributing on Action 11d: Make salaries and grading more competitive with industry, and establish a career path for environmental professionals.

Milestone Date: 2 years

Lead Agency: ASA(I,L&E)

Contributing on Action 13a: Assign the EQCC, whose core members are noted in Issue 10, the mission of providing Material Assessment for the Army, with the authority to assign these costs to bids during the review process, as described under Issue 3 and approve purchases. This committee will contain the expertise of production personnel, environmental, safety, etc., as described in the revised AR 200-1. Approval for purchase would allow the material to be brought into central stores.

Milestone Date: 2.5 years

Lead Agency: MACOMs

Defense Logistics Agency

The Defense Logistics Agency does not have the lead on any action, and is a contributing agency on two actions.

Contributing on Action 6e: Interface the management information system described in 6b with the supply/procurement procedures. Data must be accepted at the time of delivery, and the management program should generate tracking and labeling documents for use on post.

Milestone Date: 1.5 years

Lead Agency: ACE

Contributing on Action 6f: Develop a bar coding system for hazardous materials and hazardous wastes with automatic field readers which can directly download to the management information system described in 6d.

Milestone Date: 2 years

Lead Agency: DCSLOG

Deputy Assistant Secretary of the Army (Procurement)

The Deputy Assistant Secretary of the Army (Procurement) has the lead on one (1) action and is not a contributing agency on any actions.

Action 3b: Develop guidelines for the sole source justification of non-hazardous materials, or materials which do not generate hazardous wastes, in place of equal performance materials which are hazardous, or which generate hazardous waste.

Milestone Date: 1 year

Contributing Agencies: None

Deputy Chief of Staff for Logistics

The Deputy Chief of Staff for Logistics has the lead on the following three (3) actions, and is a contributing agency on 11 actions.

Action 7e: Establish a policy of release of tracking system information only after system calibrations and testing has been completed.

Milestone Date: 1 year

Contributing Agencies: TJAG, ACE

Action 6f: Develop a bar coding system for hazardous materials and hazardous wastes with automatic field readers which can directly download to the management information system described in 6d.

Milestone Date: 2 years

Contributing Agencies: CoE, DLA, AMC

Action 6g: Establish a central warehouse or electronically interconnected network of warehouses. Require all contractors and tenants to receive materials through the warehouse or network. Interface receiving with hazardous material management information system.

Milestone Date: 2 years

Contributing Agencies: MACOMs

Contributing on Action 12a: All mil-specs, DMWRS, Technical Manuals, and Army Regulations where the Army is the lead standardization agency must be reviewed and updated to identify specifications that require HM to be used and to change these items to require less hazardous or non-hazardous substitutes or to allow alternative substances and practices in the performance of the work.

Milestone Date: Initiate at 6 months, then continue until all documents have been reviewed.

Lead Agency: ASA(RDA)

Contributing on Action 6d: The Army must provide an automated data management tool to the Environmental Coordinator which provides aggregated information (for management purposes) to higher staff echelons (MACOM, DA, etc.) which addresses the recommendations of the Shatto report (1989).

Milestone Date: 1 year

Lead Agency: ACE

Contributing on Action 12b: Establish a mechanism for update of the HMIS with new or modified MSDSs as products are introduced or changed. Execute an initial complete update and revise as more MSDSs are provided.

Milestone Date: 1 year

Lead Agency: ASA(RDA)

Contributing on Action 6e: Interface the management information system described in 6b with the supply/procurement procedures. Data must be accepted at the time of delivery, and the management program should generate tracking and labeling documents for use on post.

Milestone Date: 1.5 years

Lead Agency: ACE

Contributing on Action 7a: Integrate information on the issue of liability into training courses on hazardous materials management developed under Issue 5, Actions A and B. Develop environmental liability warning statement to be included in block 7, Specific Hazards and Precautions section, of DD Form 2521 and 2522, Hazardous Chemical Warning Label. Consider integrating the liability stickers into the barcode application system.

Milestone Date: 1.5 Years

Lead Agency: TJAG

Contributing on Action 8b: Prepare guidance identifying each major organization/program in HM/HW operations (USATHAMA, MANTECH, DESCOM, etc.), the scope of their operations and the framework for interaction.

Milestone Date: 1.5 years

Lead Agency: ASA(RDA)

Contributing on Action 1b: Develop an Army Materials Assessment Procedure which addresses material fate and projected treatment and disposal costs. Initial costs will be based on estimates of the fates of materials (to air, water, solid, sludge, etc.), and later refined by material mass balances derived from the material tracking and quantification system.

Milestone Date: 2 years

Lead Agency: ACE

Contributing on Action 1g: Adopt revisions to Army acquisition regulations anticipated under SARDA Study I. Pass request through DA to DOD or other appropriate agency for regulations which are under control of other Federal agencies, including a description of the revisions used in SARDA Study I.

Milestone Date: 2 years

Lead Agency: ASA(RDA)

Contributing on Action 1h: The Program Manager/Program Executive Office (PM/PEO) will include program requirements and resources in his program master plans such as the Integrated Logistics Support Plan (for Logistics aspects such as maintenance), the Test and Evaluation Master Plan (for evaluation of alternative substances), the Production Readiness Master Plan (for alternate manufacture and materials/processes) System Safety Program Plan and System Manpower and Integration Plan.

Milestone Date: 2 years

Lead Agency: ASA(RDA)

Contributing on Action 3a: Provide the Army Material Assessment Procedure to all bidders on a contract, and require them to perform this assessment on their product to produce the bid. Provide estimates of material fate for the process to the bidders. Review the method calculation as part of bid evaluation and assign the proper calculated cost for an overall bid. This extends the Material Assessment Procedure required for PMs/PEOs in systems acquisition to all contracts including those for off-the-shelf items.

Milestone Date: 2.5 years

Lead Agency: MACOMs

Contributing on Action 6h: Provide requirements in RFPs and contracts for the use of the Army management information system, and require that the database be updated periodically and available for Army review.

Milestone Date: 2.5 years

Lead Agency: ASA(RDA)

Deputy Chief of Staff for Operations and Plans

The Deputy Chief of Staff for Operations and Plans has the lead on the following action, and is a contributing agency on three (3) actions.

Action 5c: Modify AR 350-1 to add environmental training and environmental compliance to commander's Officer Evaluation Reports (OERs) and to supervisors performance appraisals.

Milestone Date: 1 year

Contributing Agencies: MACOMs, ACE

Contributing on Action 1a: Review operational requirements documentation, identify uses of hazardous material, compare proven alternatives, and propose revisions for proponent review. Establish policy which institutionalizes the issue of minimizing the use of HM in operational requirements for future systems.

Milestone Date: 6 months

Lead Agency: CoE

Contributing on Action 5a: Prepare training courses and materials for Basic Training, Advanced Individual Training, Officers Basic and Advanced Course, NCO development courses, and senior service schools. Develop and disseminate "Train-the-Trainer" packages and training aides to support all statutory training requirements.

Milestone Date: 2 years

Lead Agency: TRADOC

Contributing on Action 13b: Assign the EQCC the mission of defining how materials can be used on post. Before the material is released from central stores, the committee would ensure that the material was being used as proposed, that proper equipment and controls were available, etc. The use of such committee review would be phased in, along with material tracking and quantification, starting with the five largest material flow streams and followed by the next five largest material flow streams, each six months until all hazardous materials came under committee review.

Milestone Date: 2.5 Years

Lead Agency: CoE

Deputy Chief of Staff for Personnel

The Deputy Chief of Staff for Personnel has the lead on the following action, and is a contributing agency on five (5) actions.

Action 11e: Provide variances for critical positions on environmental staffs at all levels.

Milestone Date: 6 months

Contributing Agency: CoE

Contributing on Action 11a: Structure environmental staffs to give them authority over or maneuverability among operational and support elements. Staffs must be able to coordinate activities among engineering, logistics, contracting, and operations.

Milestone Date: 1 year

Lead Agency: CoE

Contributing on Action 1f: Provide funds to develop courses on Army developed HAZMIN and tracking/quantification procedures and require instruction on these to same personnel. Provide funds for system and product Research and Development (R&D) personnel, maintenance personnel, and production personnel to complete training required under:

1) Department of Transportation (49 CFR 173-177),

2) Occupational Safety and Health Administration (29 CFR 1910.1200),

3) Resource Conservation and Recovery Act (40 CFR 264.16 and 265.16),

4) Superfund Amendments and Reauthorization Act Title III.

Milestone Date: 1 year

Lead Agency: ACE

Contributing on Action 11b: Develop an environmental staffing guide.

Milestone Date: 1.5 years

Lead Agency: CoE

Contributing on Action 11c: Increase authorizations for environmental positions on installation and MACOM TDAs.

Milestone Date: 2 years

Lead Agency: ASA(I,L&E)

Contributing on Action 11d: Make salaries and grading more competitive with industry, and establish a career path for environmental professionals.

Milestone Date: 2 years

Lead Agency: ASA(I,L&E)

Director of Army Safety

The Director of Army Safety does not have the lead on any action, but is a contributing agency on 11 actions.

Contributing on Action 1a: Review operational requirements documentation, identify uses of hazardous material, compare proven alternatives, and propose revisions for proponent review. Establish policy which institutionalizes the issue of minimizing the use of HM in operational requirements for future systems.

Milestone Date: 6 months

Lead Agency: CoE

Contributing on Action 1f: Provide funds to develop courses on Army developed HAZMIN and tracking/quantification procedures and require instruction on these to same personnel. Provide funds for system and product Research and Development (R&D) personnel, maintenance personnel, and production personnel to complete training required under:

1) Department of Transportation (49 CFR 173-177),

2) Occupational Safety and Health Administration (29 CFR 1910.1200),

3) Resource Conservation and Recovery Act (40 CFR 264.16 and 265.16),

4) Superfund Amendments and Reauthorization Act Title III.

Milestone Date: 1 year

Lead Agency: ACE

Contributing on Action 12b: Establish a mechanism for update of the HMIS with new or modified MSDSs as products are introduced or changed. Execute an initial complete update and revise as more MSDSs are provided.

Milestone Date: 1 year

Lead Agency: ASA(RDA)

Contributing on Action 1j: Establish multi-disciplinary team of expertise in system acquisition, design, environmental and industrial engineering, and safety for source selection evaluation to proactively assist the PM/PEO's and other managers of new equipment and perform an independent (i.e., third party) review and assessment of the programs prior to major milestones (Defense Acquisition Board, Army Systems Acquisition Review

Council, In-Process Review).

Milestone Date: 1.5 years

Lead Agency: ASA(RDA)

<u>Contributing on Action 7a</u>: Integrate information on the issue of liability into training courses on hazardous materials management developed under Issue 5, Actions A and B. Develop environmental liability warning statement to be included in block 7, Specific Hazards and Precautions section, of DD Form 2521 and 2522, Hazardous Chemical Warning Label. Consider integrating the liability stickers into the barcode application system.

Milestone Date: 1.5 Years

Lead Agency: TJAG

<u>Contributing on Action 1b</u>: Develop an Army Materials Assessment Procedure which addresses material fate and projected treatment and disposal costs. Initial costs will be based on estimates of the fates of materials (to air, water, solid, sludge, etc.), and later refined by material mass balances derived from the material tracking and quantification system.

Milestone Date: 2 years

Lead Agency: ACE

<u>Contributing on Action 1d</u>: Provide a description of the Material Assessment Procedure within the Request For Proposal (RFP). Require a list of alternatives considered and results determined. Utilize Best Value/Quality of the item/system above the lowest bid.

Milestone Date: 2 years

Lead Agency: ASA(RDA)

<u>Contributing on Action 1e</u>: Select a committee of personnel representing weapons system acquisition, design, environmental considerations, industrial engineering and safety; train them in the Material Assessment Procedure for use in source selection, and risk assessment for handling/use/storage of HM.

Milestone Date: 2 years

Lead Agency: ASA(RDA)

<u>Contributing on Action 5a</u>: Prepare training courses and materials for Basic Training, Advanced Individual Training, Officers Basic and Advanced Course, NCO development courses, and

senior service schools. Develop and disseminate "Train-the-Trainer" packages and training aides to support all statutory training requirements.

Milestone Date: 2 years

Lead Agency: TRADOC

<u>Contributing on Action 1i</u>: Develop a risk premium calculation method and add that premium to all bids before selection. Alternatively, bids not containing materials hazardous to the environment could be assigned a high weighting in selection.

Milestone Date: 2.5 years

Lead Agency: ACE

<u>Contributing on Action 1c</u>: Require contractors, as part of their proposals, to 1) identify all HM/HW to be used or produced and estimate volume and cost for disposal; 2) require identification and evaluation of alternatives which will reduce volume or toxicity of wastes; and 3) submit written evaluation of residual material fate using the Army Material Assessment Procedure, for all hazardous materials proposed for use. Review these inputs at source selection evaluation.

Milestone Date: 3 years

Lead Agency: ASA(RDA)

Health Services Command

The Health Services Command does not have a the lead on any action, but is a contributing agency on one (1) action.

Contributing on Action 5a: Prepare training courses and materials for Basic Training, Advanced Individual Training, Officers Basic and Advanced Course, NCO development courses, and senior service schools. Develop and disseminate "Train-the-Trainer" packages and training aides to support all statutory training requirements.

Milestone Date: 2 years

Lead Agency: TRADOC

Major Commands

The Major Commands have the lead on six (6) actions and are a contributing agency on 15 actions.

Action 5e: Include a line item in contract RFPs for installation operations (e.g., equipment or grounds maintenance) to require management and worker level HW management training.

Milestone Date: Immediate

Contributing Agencies: None

Action 6c: Report waste generation by EPA waste code up to Army Environmental Office (AEO) on a biennial basis, until the Army management information system is operational. The data source will be the EPA required biennial reports.

Milestone Date: 6 months, with periodic update each 6 months until automated system is operable

Contributing Agencies: None

Action 10c: Update installation Hazardous Waste Management Plans and Hazardous Waste Minimization Plans to include all functional areas and their responsibilities.

Milestone Date: 1 year

Contributing Agencies: None

Action 3a: Provide the Army Material Assessment Procedure to all bidders on a contract, and require them to perform this assessment on their product to produce the bid. Provide estimates of material fate for the process to the bidders. Review the method calculation as part of bid evaluation and assign the proper calculated cost for an overall bid. This extends the Material Assessment Procedure required for PMs/PEOs in systems acquisition to all contracts including those for off-the-shelf items.

Milestone Date: 2.5 years

Contributing Agencies: DCSLOG, ASA(RDA)

Action 13a: Assign the EQCC, whose core members are noted in Issue 10, the mission of providing Material Assessment for the Army, with the authority to assign these costs to bids during the review process, as described under Issue three (3) and approve purchases. This committee will contain the expertise of production personnel, environmental, safety, etc., as described in the revised AR 200-1. Approval for purchase would allow the material

to be brought into central stores.

Milestone Date: 2.5 years

Contributing Agency: CoE

Action 13c: Develop supplemental instruction to establish the missions described in Issues 13a and 13b in the EQCC.

Milestone Date: 2.5 years

Contributing Agencies: None

Contributing on Action 6a: Army activities, in agreement with the Environmental Protection Agency (EPA) and DOD, must make a decision regarding the definition of hazardous waste and hazardous material so that it can accurately report and manage these materials.

Milestone Date: 6 months

Lead Agency: ACE

Contributing on Action 9a: Revise installation organization Army Regulation (AR 5-3) to move the environmental office to a level representative of the partnership between ASA(RDA), ACE and DCSLOG.

Milestone Date: 6 months

Lead Agency: CoE

Contributing on Action 12a: All mil-specs, DMWRS, Technical Manuals, and Army Regulations where the Army is the lead standardization agency must be reviewed and updated to identify specifications that require HM to be used and to change these items to require less hazardous or non-hazardous substitutes or to allow alternative substances and practices in the performance of the work.

Milestone Date: Initiate at 6 months, then continue until all documents have been reviewed.

Lead Agency: ASA(RDA)

Contributing on Action 4b: Develop a prototype implementation strategy format for inclusion in the initial research and development project proposal.

Milestone Date: 1 year

Lead Agency: ACE

Contributing on Action 5c: Modify AR 350-1 to add environmental training and environmental compliance to commander's Officer Evaluation Reports (OERs) and to supervisors performance appraisals.

Milestone Date: 1 year

Lead Agency: DCSOPS

Contributing on Action 5d: Coordinate training efforts among environmental personnel, industrial hygienists, and safety officers to establish training requirements at installations, MACOMs, etc.

Milestone Date: 1 year

Lead Agency: ACE

Contributing on Action 6d: The Army must provide an automated data management tool to the Environmental Coordinator which provides aggregated information (for management purposes) to higher staff echelons (MACOM, DA, etc.) which addresses the recommendations of the Shatto report (1989).

Milestone Date: 1 year

Lead Agency: ACE

Contributing on Action 11a: Structure environmental staffs to give them authority over or maneuverability among operational and support elements. Staffs must be able to coordinate activities among engineering, logistics, contracting, and operations.

Milestone Date: 1 year

Lead Agency: CoE

Contributing on Action 13d: EQCC's should coordinate with state regulatory agencies, and with other Army installations in that state, to develop compliance strategies and coordinate actions of mutual interest which are unique to that state.

Milestone Date: 1 year

Lead Agency: CoE

Contributing on Action 6e: Interface the management information system described in 6b with the supply/procurement procedures. Data must be accepted at the time of delivery, and the

management program should generate tracking and labeling documents for use on post.

Milestone Date: 1.5 years

Lead Agency: ACE

Contributing on Action 10a: Make it a mission of the installation and MACOM Environmental Quality Control Council (EQCC) to identify incoming HM and its life-cycle cost to the Army. Also, make it the mission of the EQCC to determine alternatives to the status quo and institute the best alternative.

Milestone Date: 1.5 years

Lead Agency: CoE

Contributing on Action 5b: Either develop in-house training material for the civilian workforce that can be presented by Army personnel at the installation level or identify a training center for people to be sent to.

Milestone Date: 2 years

Lead Agency: CoE

Contributing on Action 6g: Establish a central warehouse or electronically interconnected network of warehouses. Require all contractors and tenants to receive materials through the warehouse or network. Interface receiving with hazardous material management information system.

Milestone Date: 2 years

Lead Agency: DCSLOG

Contributing on Action 1i: Develop a risk premium calculation method and add that premium to all bids before selection. Alternatively, bids not containing materials hazardous to the environment could be assigned a high weighting in selection.

Milestone Date: 2.5 years

Lead Agency: ACE

Contributing on Action 13b: Assign the EQCC the mission of defining how materials can be used on post. Before the material is released from central stores, the committee would ensure that the material was being used as proposed, that proper equipment and controls were available, etc. The use of such committee review would be phased in, along with material tracking and quantification, starting with the five largest material flow

streams and followed by the next five largest material flow streams, each six months until all hazardous materials came under committee review.

Milestone Date: 2.5 Years

Lead Agency: CoE

Office of the Surgeon General

The Office of the Surgeon General does not have the lead on any action, but is a contributing agency on four (4) actions.

Contributing on Action 12b: Establish a mechanism for update of the HMIS with new or modified MSDSs as products are introduced or changed. Execute an initial complete update and revise as more MSDSs are provided.

Milestone Date: 1 year

Lead Agency: ASA(RDA)

Contributing on Action 1j: Establish multi-disciplinary team of expertise in system acquisition, design, environmental and industrial engineering, and safety for source selection evaluation to proactively assist the PM/PEO's and other managers of new equipment and perform an independent (i.e., third party) review and assessment of the programs prior to major milestones (Defense Acquisition Board, Army Systems Acquisition Review Council, In-Process Review).

Milestone Date: 1.5 years

Lead Agency: ASA(RDA)

Contributing on Action 1e: Select a committee of personnel representing weapons system acquisition, design, environmental considerations, industrial engineering and safety; train them in the Material Assessment Procedure for use in source selection, and risk assessment for handling/use/storage of HM.

Milestone Date: 2 years

Lead Agency: ASA(RDA)

Contributing on Action 1i: Develop a risk premium calculation method and add that premium to all bids before selection. Alternatively, bids not containing materials hazardous to the environment could be assigned a high weighting in selection.

Milestone Date: 2.5 years

Lead Agency: ACE

Public Affairs Office, Headquarters Department of Army

The Public Affairs Office, Headquarters Department of Army has the lead on two (2) actions but is not a contributing agency on any action.

Action 5f: Develop a general awareness campaign similar in scope to the Army Energy Awareness program.

Milestone Date: 1 year

Contributing Agencies: None

Action 7b: Develop a poster campaign to caution about potential liability for misuse to be located throughout work areas, self-help areas and possibly workshops/garages in family housing areas.

Milestone Date: 1.5 Years

Contributing Agencies: None

The Judge Advocate General

The Judge Advocate General has the lead on four (4) actions and is a contributing agency on one (1) action.

Action 9c: Have the Judge Advocate General (TJAG) send letters to all installation commanders detailing their HW management responsibilities from a legal perspective and their relationship with the Staff Judge Advocate.

Milestone Date: 6 months

Contributing Agencies: None

Action 7c: Establish a committee of legal expertise on HM/HW liability to participate in the Material Assessment Procedure. Designate a responsible party and establish a telephone hotline.

Milestone Date: 1 year

Contributing Agencies: None

Action 7d: Establish a committee of legal expertise to review statutes and court actions, and to report to field operating personnel via regular publications such as "USATHAMA Environmental Update" and EHSC's "DEH Digest".

Milestone Date: 1 year

Contributing Agency: ACE

Action 7a: Integrate information on the issue of liability into training courses on hazardous materials management developed under Issue 5, Actions A and B. Develop environmental liability warning statement to be included in block 7, Specific Hazards and Precautions section, of DD Form 2521 and 2522, Hazardous Chemical Warning Label. Consider integrating the liability stickers into the barcode application system.

Milestone Date: 1.5 Years

Contributing Agencies: CoE, DASAF, DCSLOG

Contributing on Action 7e: Establish a policy of release of tracking system information only after system calibrations and testing has been completed.

Milestone Date: 1 year

Lead Agency: DCSLOG

Training and Doctrine Command

The Training and Doctrine Command has the lead on one (1) action, and is a contributing agency on three (3) actions.

Action 5a: Prepare training courses and materials for Basic Training, Advanced Individual Training, Officers Basic and Advanced Course, NCO development courses, and senior service schools. Develop and disseminate "Train-the-Trainer" packages and training aides to support all statutory training requirements.

Milestone Date: 2 years

Contributing Agencies: CoE, OTSG, DASAF, DCSOPS

Contributing on Action 1a: Review operational requirements documentation, identify uses of hazardous material, compare proven alternatives, and propose revisions for proponent review. Establish policy which institutionalizes the issue of minimizing the use of HM in operational requirements for future systems.

Milestone Date: 6 months

Lead Agency: CoE

Contributing on Action 10b: Provide EQCC members with environmental management training. Prepare a training program for this group that emphasizes life-cycle costs, liabilities, and HM/HW management.

Milestone Date: 1 year

Lead Agency: CoE

Contributing on Action 1g: Adopt revisions to Army acquisition regulations anticipated under SARDA Study I. Pass request through DA to DOD or other appropriate agency for regulations which are under control of other Federal agencies, including a description of the revisions used in SARDA Study I.

Milestone Date: 2 years

Lead Agency: ASA(RDA)

VI REFERENCES

DoD Directive Number 4210.15, 27 JUL 89, "Hazardous Material Pollution Prevention."

EPA, "Report to Congress, Minimization of Hazardous Waste," EPA/530-SW-86-033A, October, 1986.

Memorandum from MG Peter J. Offringa, 19 JUN 89, Subject: Integrated Hazardous Materials/Hazardous Waste Management Plan.

Memorandum from Deputy Assistant Secretary of Defense William H. Parker, 28 JUL 89, Subject: Hazardous Material Pollution Prevention Directive.

Minton, B., "Locality Raises Applauded, But Seen as Only First Step", Federal Times, 26 FEB 90, p3.

Shatto, A. and L., Inc., "System Plan for an Army-Wide Environmental Data System", 08 SEP 89.

APPENDIX A

The following acronyms and abbreviations have been used throughout the text.

Acronym	Definition
AAEMIS	Army Automated Environmental Management Information System
ACE	Assistant Chief of Engineers
AEO	Army Environmental Office
AIF	Army Industrial Fund
AMC	Army Materiel Command
AMS	Army Management Structure
ASA(FM)	Assistant Secretary of the Army (Financial Management)
ASA(I,L&E)	Assistant Secretary of the Army (Installations, Logistics, and Environment)
ASA(RDA)	Assistant Secretary of the Army (Research, Development and Acquisition
CDC	Child Development Center
COCO	Contractor Owned, Contractor Operated
CoE	Chief of Engineers
DA	Department of Army
DASAF	Director of Army Safety
DCSLOG	Deputy Chief of Staff for Logistics
DCSOPS	Deputy Chief of Staff for Operations and Plans
DCSPER	Deputy Chief of Staff for Personnel
DEH	Directorate of Engineering and Housing
DERA	Defense Environmental Restoration Account
DESCOM	Depot Systems Command

Acronym	Definition
Acronym	Definition
DLA	Defense Logistics Agency
DMWRs	Depot Maintenance Work Requirements
DOD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
DRMS	Defense Reutilization and Marketing Service
EHSC	Engineering and Housing Support Command
EQCC	Environmental Quality Control Council
FORSCOM	Forces Command
FSC	Federal Supply Code
GOCO	Government Owned, Contractor Operated
GOGO	Government Owned, Government Operated
HAZMIN	Hazardous Waste Minimization
HM/HW	Hazardous Material/Hazardous Waste
HMIS	Hazardous Material Information System
HMMS	Hazardous Material Management Systems
MACOMs	Major Commands
MANTECH	Manufacturing Technology Thrust Area
MCA	Military Construction, Army
MSDS	Material Safety Data Sheet
NCO	Non-Commissioned Officers
NOV	Notice of Violation
NSN	National Stock Number
OERs	Officer Evaluation Reports
OMA	Operation and Maintenance Account

Acronym	Definition
Acronym	Definition
OTSG	Office of the Surgeon General
HQDA-PAO	Headquarters Department of Army, Public Affairs Office
PEO	Program Executive Office
PM	Program Manager
POC	Point of Contact
PRMP	Production Readiness Master Plan
R&D	Research and Development
RDT&E	Research, Development, Testing and Evaluation
RFP	Request for Proposal
SAACONS	Standard Army Automated Contracting System
TDA	Table of Distribution and Allowance
TJAG	The Judge Advocate General
TRADOC	Training and Doctrine Command
UMMCA	Unspecified Minor Military Construction Account
USACERL	U. S. Army Construction Engineering Research Laboratory
USATHAMA	U. S. Army Toxic and Hazardous Materials Agency

APPENDIX B

Graphic Presentation of Plan Schedule

The following is a listing of the Action Items in the plan, using arrows and points to indicate the schedule. Arrows indicate the period over which an item (e.g., a module of the management information system) is developed, whereas points indicate where new systems/policies are implemented.

USACE
DOE/ANL

The following literature is in reference to:

Project #	Project Title
63	Environmental Analysis/Technology Assessment/Database Development

#63

Department of Energy

Argonne Area Office
9800 South Cass Avenue
Argonne, Illinois 60439

AUG 24 1988

Commander
U.S. Army Toxic and Hazardous
Materials Agency
ATTN: AMXTH-RM
Aberdeen Proving Ground, MD 21010-5401

Dear Commander:

SUBJECT: ARMY MIPR NO. MIPR3038

This letter confirms the U.S. Department of Energy's (DOE's) acceptance of the subject MIPR for work to be performed by the Argonne National Laboratory (ANL).

ANL Proposal No.	Amount
P-88119	$100,000

Title: "Environmental Analysis and Technical Assessment for the U.S Army Corp of Engineers and Housing Support Center"

The work performed by ANL will be on a "best efforts basis" and in accordance with DOE's contract with The University of Chicago for the operation of ANL (Contract No. W-31-109-ENG-38).

ANL is authorized to proceed upon receipt of a copy of this letter. If you have questions regarding this agreement you may call me at Coml. 312/972-2229, or FTS 972-2229. Please reference the above ANL Proposal No. in all future correspondence.

Sincerely,

Roberta J. Dalton, Program Analyst
Work-for-Others Program

Enclosure:
1. Subject MIPR
2. Acceptance of MIPR

cc w/encl: M. Bartos, ANL
J. Wozniak, ANL
M. Hennebry, ANL

Department of Energy
Argonne Area Office
9800 South Cass Avenue
Argonne, Illinois 60439

SEP 30 1988

Ms. Chris Sparks
U.S. Army Toxic and Hazardous
Materials Agency
ATTN: AMXTH-RM-P
Aberdeen Proving Ground, MD 21010-5401

Dear Ms. Sparks:

SUBJECT: ARMY MIPR NO. "MIPR3088," AMENDMENT 1

This letter confirms the U.S. Department of Energy's (DOE's) acceptance of the subject MIPR for work to be performed by the Argonne National Laboratory (ANL). This acceptance is conditional pending our receipt of an acceptable proposal from ANL. ANL will be authorized to proceed when we have approved the proposal.

ANL Proposal No.	Amount
P-88119, Revised	$300,000

Title: "Environmental Analysis and Technical Assessment for the U.S. Army Corp. of Engineers and Housing Support Center"

The work performed by ANL will be on a "best efforts basis" and in accordance with DOE's contract with the University of Chicago for the operation of ANL (Contract no. W-31-109-ENG-38).

If you have questions regarding this agreement you may call me at Coml. 312/972-2229, or FTS 972-2229. Please reference the above ANL Proposal No. in all future correspondence.

Sincerely,

Roberta J. Dalton
Program Analyst, Work-for-Others Program

Enclosure:
1. Subject MIPR
2. Acceptance of MIPR

cc w/encl: M. Bartos, ANL
J. Wozniak, ANL
M. Hennebry, ANL

F

MILITARY INTERDEPARTMENTAL PURCHASE REQUEST

PAGE 1 OF 1 PAGES

2. FSC	3. CONTROL SYMBOL NO.	4. DATE PREPARED	5. MIPR NUMBER	6. AMEND NO.
		28 Sep 88	MIPR3088	1

7. TO

DOE Argonne Area Office
ATTN: Ms. Robbie Dalton
9800 S. Cass Avenue
Argonne, IL 60439

8. FROM: (Agency, name, telephone number of originator)

Commander, U.S. Army Toxic and Hazardous Materials Agency, ATTN: AMXTH-RM
Aberdeen Proving Ground, MD 21010-5401
AUTOVON 584-4332, Commercial 301-676-8087

9. ITEMS ☐ ARE ☐ ARE NOT INCLUDED IN THE INTERSERVICE SUPPLY SUPPORT PROGRAM AND REQUIRED INTERSERVICE SCREENING ☐ HAS ☐ HAS NOT BEEN ACCOMPLISHED

ITEM NO. a	DESCRIPTION (Federal stock number, nomenclature, specification and/or drawing No., etc.) b	QTY c	UNIT d	ESTIMATED UNIT PRICE e	ESTIMATED TOTAL PRICE f
1	Increase to FY88 funding for Project HXW Hazardous Waste Minimization (HAZMIN) Program for USACE Support. Proposal Number P88119 applies.			ORIG Amend 01	$100,000.00 +300,000.00
2	Signed acceptance of DD Form 448-2 should be DATAFAXED ASAP to (301) 671-2008 and two signed hard copies be mailed to address in block 8.				
3	USATHAMA Financial POC: Margaret Taylor, AMXTH-RM, commerical, (301) 671-8087. USATHAMA Tech POC: LTC Metzger, AUTOVON (301) 671-3618 or Danny Akers, (301) 676-8087 ANL Technical: Mary Ellen Hennebry, (312) 972-3743.				
4	Certified as to availability of funds not to exceed $400,000.00 under the appropriation cited in Block 14 by: Margaret C Taylor FOR: S. GAST 9/29/88. Finance & Accounting Off				
5	All other conditions remain the same.				

10. SEE ATTACHED PAGES FOR DELIVERY SCHEDULES, PRESERVATION AND PACKAGING INSTRUCTIONS, SHIPPING INSTRUCTIONS AND INSTRUCTIONS FOR DISTRIBUTION OF CONTRACTS AND RELATED DOCUMENTS.

11. GRAND TOTAL $400,000.00

12. TRANSPORTATION ALLOTMENT *(Used if FOB Contractor's plant)*

13. MAIL INVOICES TO *(Payment will be made by)*
Cdr, USAAPGSA, ATTN: STEAP-RM-FP-V
APG, MD 21005-5001

PAY OFFICE DODAAD

14. FUNDS FOR PROCUREMENT ARE PROPERLY CHARGEABLE TO THE ALLOTMENTS SET FORTH BELOW. THE AVAILABLE BALANCES OF WHICH ARE SUFFICIENT TO COVER THE ESTIMATED TOTAL PRICE.

ACRN	APPROPRIATION	LIMIT/SUBHEAD	SUPPLEMENTAL ACCOUNTING CLASSIFICATION	ACCTG STA DODAAD	AMOUNT
	2182020		6A-7319 P788008.14 2572 MIPR30887827886002 S18001 ORXW CC789000 EOC 444	S18001	$400,000.00

15. AUTHORIZING OFFICER *(Type name and title)*
H. R. FEINBERG, C, Resr Mgt Div

16. SIGNATURE

17. DATE 9/29/88

DD FORM 1 JUN 72 448

PREVIOUS EDITION IS OBSOLETE.

29 SEP 1988

FILE

ACCEPTANCE OF MIPR

1. TO (Requiring Activity Address) (Include ZIP Code)
COMMANDER, U.S. ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY, ATTN: AMXTH-RM
ABERDEEN PROVING GROUND, MD 21010-5401

2. MIPR NUMBER: MIPR3088

3. AMENDMENT NO.: 1

4. DATE (MIPR Signature Date): 28 Sep 88

5. AMOUNT (As Listed on the MIPR): 400,000.00

6. The MIPR identified above is accepted and the items requested will be provided as follows. (Check as Applicable)

a. [X] ALL ITEMS WILL BE PROVIDED THROUGH REIMBURSEMENT (Category I)

b. [ ] ALL ITEMS WILL BE PROCURED BY THE DIRECT CITATION OF FUNDS (Category II)

c. [ ] ITEMS WILL BE PROVIDED BY BOTH CATEGORY I AND CATEGORY II AS INDICATED BELOW

d. [ ] THIS ACCEPTANCE, FOR CATEGORY I ITEMS, IS QUALIFIED BECAUSE OF ANTICIPATED CONTINGENCIES AS TO FINAL PRICE. CHANGES IN THIS ACCEPTANCE FIGURE WILL BE FURNISHED PERIODICALLY UPON DETERMINATION OF DEFINITIZED PRICES, BUT PRIOR TO SUBMISSION OF BILLINGS.

7. [ ] MIPR ITEM NUMBER(S) IDENTIFIED IN BLOCK 13, "REMARKS" IS NOT ACCEPTED (IS REJECTED) FOR THE REASONS INDICATED.

8. TO BE PROVIDED THROUGH REIMBURSEMENT — CATEGORY I

ITEM NO. a	QUANTITY b	ESTIMATED PRICE c
	ORIG	$ 100,000.00
	Amend 01	+300,000.00
d. TOTAL ESTIMATED PRICE		$400,000.00

9. TO BE PROCURED BY DIRECT CITATION OF FUNDS — CATEGORY II

ITEM NO. a	QUANTITY b	ESTIMATED PRICE c
d. TOTAL ESTIMATED PRICE		

ACCEPTANCE COPY TO APG
DATE: 30 Sep 88

10. ANTICIPATED DATE OF OBLIGATION FOR CATEGORY II ITEMS

11. GRAND TOTAL ESTIMATED PRICE OF ALL ITEMS: $400,000.00

12. FUNDS DATA (Check if Applicable)

a. [ ] ADDITIONAL FUNDS IN THE AMOUNT OF $________ ARE REQUIRED (See Justification in Block 13)

b. [ ] FUNDS IN THE AMOUNT OF $________ ARE NOT REQUIRED AND MAY BE WITHDRAWN

13. REMARKS

Datafax this acceptance to (301) 671-2008 ASAP. Please expedite.
If unable to accept, please call (301) 676-8087, Chris Sparks, immediately.

14. ACCEPTING ACTIVITY (Complete Address)
Dept. of Energy, Argonne Area Ofc
9800 South Cass Ave.
Argonne, IL 60439

15. TYPED NAME AND TITLE OF AUTHORIZED OFFICIAL
JAMES A. BUCHAR, CHIEF
ADMINISTRATIVE BRANCH
CONTRACTING OFFICER

16. SIGNATURE: James A. Buchar

17. DATE: 9/29/88

DD FORM 1 JUL 71 448-2 — PREVIOUS EDITION WILL BE USED UNTIL EXHAUSTED.

U.S. Government Printing Office: 1982-564-006/0424

MIPR 3088

FUNDING AUTHORIZATION/CHANGE ACTION (USATHAMA Reg 5-1)

Date 9/28/88

TO:
Chief, Resource Management Div

FROM:
9/28/88

1. Project Number & Title HAZMIN
HXW ~~USACE DA~~ HDQ DA ENV. Office

2. Perf Installation
ARGONNE

3. Appropriation FY 88

✓ OMA .14 — 1 Qtr
PAA — 2 Qtr
RDTE — 3 Qtr
4 Qtr ✓

4. Annual Funding Program Summary

AFP	Inc/(Dec)	Rev
$ 0	$ 300 K	$ 300K

5. Scope of Work (Description by Task and Dollars)

	AFP	Curr Amt	Inc/(Dec)	Cum
HAZMIN PROGRAM SUPPORT	$ 300	$ 0	$ 300	$ 300

ANL Proposal No.
P-88119 Revision 1 applies

6. Task Completion Dates:
Tech ANL POC - Mary Ellen Henneby 312-972-3743
Financial POC - Robbie Daitar

7. Scientific & Technical Information Prog Applies: ___ Yes ___ No

Information/Study Release Approval: ___ Yes ___ No

8. Recommendation - Project Officer
D E Akers

Concurrence - Cost Est - Analysis
D E Akers

9. Approval - Division Chief
[signature]

Threshold Approval Required
___ Yes ✓ No
DA 9/28
PROGRAM/BUDGET

10. Threshold Approval - Commander

THAMA Form 9, 1 Aug 79, Replaces CDIR Form 9, 12 Mar 79 edition which is obsolete.

MILITARY INTERDEPARTMENTAL PURCHASE REQUEST

1. PAGE 1 OF 3 PAGES

2. FSC	3. CONTROL SYMBOL NO.	4. DATE PREPARED	5. MIPR NUMBER	6. AMEND NO.
		4 Aug 88	MIPR3088	ORIG

7. TO:
DOE Argonne Area Office
ATTN: Ms. Robbie Dalton
9800 S. Cass Avenue
Argonne, IL 60439

8. FROM: *(Agency, name, telephone number of originator)*
Commander, U.S. Army Toxic and Hazardous Materials Agency, ATTN: AMXTH-RM
Aberdeen Proving Ground, MD 21010-5401
AUTOVON 584-4332, Commercial 301-676-8087

9. ITEMS ☐ ARE ☐ ARE NOT INCLUDED IN THE INTERSERVICE SUPPLY SUPPORT PROGRAM AND REQUIRED INTERSERVICE SCREENING ☐ HAS ☐ HAS NOT BEEN ACCOMPLISHED.

ITEM NO. a	DESCRIPTION *(Federal stock number, nomenclature, specification and/or drawing No., etc.)* b	QTY. c	UNIT d	ESTIMATED UNIT PRICE e	ESTIMATED TOTAL PRICE f
1	FY88 funding for Project HKW Hazardous Waste Minimization (HAZMIN) Program for USACE Support. Proposal Number P88119 applies.			ORIG	$100,000.00
a.	Any other USATHAMA requested work is strictly prohibited from being charged to the accounting classification cited in block 14 of this instrument.				
2	Expiration date for obligation is 30 Sep 88.				
3	This order is placed pursuant to the Economy Act. It has been determined that this action is in the best interest of the Government, since Argonne National Lab will provide environmental analysis and technical evaluations in the following areas: develop and finalize program plans, environmental analysis and technology assessment, waste minimization, information data base development, environmental management analyses, and other activities based on FEMA and DOI Regulatory requirements. Review by industry is not considered necessary or appropriate due to unique and diverse resources available under Argonne.			ACCEPTANCE COPY TO APG DATE: 29 Aug 88	

10. SEE ATTACHED PAGES FOR DELIVERY SCHEDULES, PRESERVATION AND PACKAGING INSTRUCTIONS, SHIPPING INSTRUCTIONS AND INSTRUCTIONS FOR DISTRIBUTION OF CONTRACTS AND RELATED DOCUMENTS.

11. GRAND TOTAL $100,000.00

12. TRANSPORTATION ALLOTMENT *(Used if FOB Contractor's plant)*

13. MAIL INVOICES TO *(Payment will be made by)*
Cdr, USAAPGSA, ATTN: STEAP-RM-FP-V
APG, MD 21005-5001
PAY OFFICE DODAAD

14. FUNDS FOR PROCUREMENT ARE PROPERLY CHARGEABLE TO THE ALLOTMENTS SET FORTH BELOW. THE AVAILABLE BALANCES OF WHICH ARE SUFFICIENT TO COVER THE ESTIMATED TOTAL PRICE.

ACRN	APPROPRIATION	LIMIT/SUBHEAD	SUPPLEMENTAL ACCOUNTING CLASSIFICATION	ACCTG STA DODAAD	AMOUNT
	2182020		6A-7319 P788008.14 2572 MIPR3088 [illegible] S13001 ORKW CC789000 EOC 444	S18001	$100,000.00

15. AUTHORIZING OFFICER *(Typed name and title)*: H. R. FEINBERG, C, Resr Mgt Div
16. SIGNATURE
17. DATE

MILITARY INTERDEPARTMENTAL PURCHASE REQUEST

2. FSC	3. CONTROL SYMBOL NO.	4. DATE PREPARED	5. MIPR NUMBER	6. AMEND NO.
		4 Aug 88	MIPR3088	ORIG

7. TO:
DOE Argonne Area Office
ATTN: Ms. Robbie Dalton
9800 S. Cass Avenue
Argonne, IL 60439

8. FROM: *(Agency, name, telephone number of originator)*
Commander, U.S. Army Toxic and Hazardous Materials Agency, ATTN: AMXTH-RM
Aberdeen Proving Ground, MD 21010-5401
AUTOVON 584-4332, Commercial 301-676-8087

9. ITEMS ☐ ARE ☐ ARE NOT INCLUDED IN THE INTERSERVICE SUPPLY SUPPORT PROGRAM AND REQUIRED INTERSERVICE SCREENING ☐ HAS ☐ HAS NOT BEEN ACCOMPLISHED.

ITEM NO. a	DESCRIPTION (Federal stock number, nomenclature, specification and/or drawing No., etc.) b	QTY. c	UNIT d	ESTIMATED UNIT PRICE e	ESTIMATED TOTAL PRICE f
4	Request two signed acceptance copies of the enclosed document (DD 448-2) be returned by mail to address in Block 8.				
5	"Do not process 1080's through the TFO System, check issue payment only". Forward reimbursement vouchers monthly to the Cdr, USAAPGSA, ATTN: STEAP-RM-FP-V (Commercial Accounts), APG, MD 21005-5001. The reimbursement voucher must include this MIPR Number and the distinct accounting classification cited in block 14 of this instrument. Only work outlined in paragraph 1 of this document is permitted to be billed against the accounting classification cited in block 14.				
6	Results or other information contained in any form (interim, draft and final reports) of this study will not be released without formal prior approval of the Cdr, U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, MD 21010-5401.				
7	USATHAMA Financial POC: Chris Sparks, AMXTH-RM, AUTOVON 584-4332/4331. USATHAMA Tech POC: LTC Metzger, AUTOVON 584-3618 or Danny Akers, AUTOVON 584-4331.				

10. SEE ATTACHED PAGES FOR DELIVERY SCHEDULES, PRESERVATION AND PACKAGING INSTRUCTIONS, SHIPPING INSTRUCTIONS AND INSTRUCTIONS FOR DISTRIBUTION OF CONTRACTS AND RELATED DOCUMENTS.

11. GRAND TOTAL

12. TRANSPORTATION ALLOTMENT *(Used if FOB Contractor's plant)*

13. MAIL INVOICES TO *(Payment will be made by)*

PAY OFFICE DODAAD

14. FUNDS FOR PROCUREMENT ARE PROPERLY CHARGEABLE TO THE ALLOTMENTS SET FORTH BELOW, THE AVAILABLE BALANCES OF WHICH ARE SUFFICIENT TO COVER THE ESTIMATED TOTAL PRICE.

ACRN	APPROPRIATION	LIMIT/SUBHEAD	SUPPLEMENTAL ACCOUNTING CLASSIFICATION	ACCTG STA DODAAD	AMOUNT

15. AUTHORIZING OFFICER *(Type name and title)*

16. SIGNATURE

MILITARY INTERDEPARTMENTAL PURCHASE REQUEST

1. PAGE 31 OF 3 PAGES

2. FSC	3. CONTROL SYMBOL NO.	4. DATE PREPARED	5. MIPR NUMBER	6. AMEND NO.
		4 Aug 88	MIPR3088	ORIG

7. TO:
DOE Argonne Area Office
ATTN: Ms. Robbie Dalton
9800 S. Cass Avenue
Argonne, IL 60439

8. FROM: *(Agency, name, telephone number of originator)*
Commander, U.S. Army Toxic and Hazardous Materials Agency, ATTN: AMXTH-RM
Aberdeen Proving Ground, MD 21010-5401
AUTOVON 584-4332, Commercial 301-676-8087

9. ITEMS ☐ ARE ☐ ARE NOT INCLUDED IN THE INTERSERVICE SUPPLY SUPPORT PROGRAM AND REQUIRED INTERSERVICE SCREENING ☐ HAS ☐ HAS NOT BEEN ACCOMPLISHED.

ITEM NO. a	DESCRIPTION *(Federal stock number, nomenclature, specification and/or drawing No., etc.)* b	QTY. c	UNIT d	ESTIMATED UNIT PRICE e	ESTIMATED TOTAL PRICE f
8	If the Dept of Energy cannot honor all the conditions set forth in this contractual document, and the proper billing procedures associated with the acceptance of this MIPR, we respectfully request that the document be returned unaccepted with an explanation.				
9	Certified as to availability of funds not to exceed $100,000.00 under the appropriation cited in Block 14 by: Margaret C Taylor 8/5/88 FOR: S. GAST Finance & Accounting Officer				

10. SEE ATTACHED PAGES FOR DELIVERY SCHEDULES, PRESERVATION AND PACKAGING INSTRUCTIONS, SHIPPING INSTRUCTIONS AND INSTRUCTIONS FOR DISTRIBUTION OF CONTRACTS AND RELATED DOCUMENTS.

11. GRAND TOTAL

12. TRANSPORTATION ALLOTMENT *(Used if FOB Contractor's plant)*

13. MAIL INVOICES TO *(Payment will be made by)*

PAY OFFICE DODAAD

14. FUNDS FOR PROCUREMENT ARE PROPERLY CHARGEABLE TO THE ALLOTMENTS SET FORTH BELOW. THE AVAILABLE BALANCES OF WHICH ARE SUFFICIENT TO COVER THE ESTIMATED TOTAL PRICE.

ACRN	APPROPRIATION	LIMIT/SUBHEAD	SUPPLEMENTAL ACCOUNTING CLASSIFICATION	ACCTG STA DODAAD	AMOUNT

15. AUTHORIZING OFFICER *(Type name and title)* | 16. SIGNATURE | 17. DATE

ACCEPTANCE OF MIPR

1. TO (Requiring Activity Address) (Include ZIP Code)
COMMANDER, U.S. ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY, ATTN: AMXTH-RM
ABERDEEN PROVING GROUND, MD 21010-5401

2. MIPR NUMBER: MIPR3088

3. AMENDMENT NO.: ORIG

4. DATE (MIPR Signature Date): 4 Aug 88

5. AMOUNT (As Listed on the MIPR): $100,000.00

6. The MIPR identified above is accepted and the items requested will be provided as follows. (Check as Applicable)

a. [X] ALL ITEMS WILL BE PROVIDED THROUGH REIMBURSEMENT (Category I)

b. [ ] ALL ITEMS WILL BE PROCURED BY THE DIRECT CITATION OF FUNDS (Category II)

c. [ ] ITEMS WILL BE PROVIDED BY BOTH CATEGORY I AND CATEGORY II AS INDICATED BELOW

d. [ ] THIS ACCEPTANCE, FOR CATEGORY I ITEMS, IS QUALIFIED BECAUSE OF ANTICIPATED CONTINGENCIES AS TO FINAL PRICE. CHANGES IN THIS ACCEPTANCE FIGURE WILL BE FURNISHED PERIODICALLY UPON DETERMINATION OF DEFINITIZED PRICES, BUT PRIOR TO SUBMISSION OF BILLINGS.

7. [ ] MIPR ITEM NUMBER(S) IDENTIFIED IN BLOCK 13, "REMARKS" IS NOT ACCEPTED (IS REJECTED) FOR THE REASONS INDICATED.

8. TO BE PROVIDED THROUGH REIMBURSEMENT CATEGORY I

ITEM NO. a	QUANTITY b	ESTIMATED PRICE c
	ORIGINAL	$100,000.00
d. TOTAL ESTIMATED PRICE		$100,000.00

9. TO BE PROCURED BY DIRECT CITATION OF FUNDS CATEGORY II

ITEM NO. a	QUANTITY b	ESTIMATED PRICE c
d. TOTAL ESTIMATED PRICE		

10. ANTICIPATED DATE OF OBLIGATION FOR CATEGORY II ITEMS

11. GRAND TOTAL ESTIMATED PRICE OF ALL ITEMS: $100,000.00

12. FUNDS DATA (Check if Applicable)

a. [ ] ADDITIONAL FUNDS IN THE AMOUNT OF $________ ARE REQUIRED (See Justification in Block 13)

b. [ ] FUNDS IN THE AMOUNT OF $________ ARE NOT REQUIRED AND MAY BE WITHDRAWN

13. REMARKS

14. ACCEPTING ACTIVITY (Complete Address)
Dept. of Energy, Argonne Area Office
9800 South Cass Avenue
Argonne, IL 60439

15. TYPED NAME AND TITLE OF AUTHORIZED OFFICIAL
JAMES A. BUCHAR, CHIEF
ADMINISTRATIVE BRANCH
CONTRACTING OFFICER

16. SIGNATURE: James A. Buchar

17. DATE: 8/23/88

DD FORM 448-2 PREVIOUS EDITION WILL BE USED UNTIL EXHAUSTED

U.S. Government Printing Office 1982-504-032/5464

#63

Department of Energy

Argonne Area Office
9800 South Cass Avenue
Argonne, Illinois 60439

SEP 3 0 1988

Ms. Chris Sparks
U.S. Army Toxic and Hazardous
Materials Agency
ATTN: AMXTH-RM-P
Aberdeen Proving Ground, MD 21010-5401

Dear Ms. Sparks:

SUBJECT: ARMY MIPR NO. "MIPR3088," AMENDMENT 1

This letter confirms the U.S. Department of Energy's (DOE's) acceptance of the subject MIPR for work to be performed by the Argonne National Laboratory (ANL). This acceptance is conditional pending our receipt of an acceptable proposal from ANL. ANL will be authorized to proceed when we have approved the proposal.

ANL Proposal No.	Amount
P-88119, Revised	$300,000

Title: "Environmental Analysis and Technical Assessment for the U.S. Army Corp. of Engineers and Housing Support Center"

The work performed by ANL will be on a "best efforts basis" and in accordance with DOE's contract with the University of Chicago for the operation of ANL (Contract no. W-31-109-ENG-38).

If you have questions regarding this agreement you may call me at Coml. 312/972-2229, or FTS 972-2229. Please reference the above ANL Proposal No. in all future correspondence.

Sincerely,

Robbie Dalton

Roberta J. Dalton
Program Analyst, Work-for-Others Program

Enclosure:
1. Subject MIPR
2. Acceptance of MIPR

cc w/encl: M. Bartos, ANL
J. Wozniak, ANL
M. Hennebry, ANL

Celebrating the U.S. Constitution Bicentennial — 1787-1987

Department of Energy
Argonne Area Office
9800 South Cass Avenue
Argonne, Illinois 60439

AUG 24 1988

Commander
U.S. Army Toxic and Hazardous
Materials Agency
ATTN: AMXTH-RM
Aberdeen Proving Ground, MD 21010-5401

Dear Commander:

SUBJECT: ARMY MIPR NO. MIPR3088

This letter confirms the U.S. Department of Energy's (DOE's) acceptance of the subject MIPR for work to be performed by the Argonne National Laboratory (ANL).

ANL Proposal No.	Amount
P-88119	$100,000

Title: "Environmental Analysis and Technical Assessment for the U.S Army Corp of Engineers and Housing Support Center"

The work performed by ANL will be on a "best efforts basis" and in accordance with DOE's contract with The University of Chicago for the operation of ANL (Contract No. W-31-109-ENG-38).

ANL is authorized to proceed upon receipt of a copy of this letter. If you have questions regarding this agreement you may call me at Coml. 312/972-2229, or FTS 972-2229. Please reference the above ANL Proposal No. in all future correspondence.

Sincerely,

Roberta Dalton

Roberta J. Dalton, Program Analyst
Work-for-Others Program

Enclosure:
1. Subject MIPR
2. Acceptance of MIPR

cc w/encl: M. Bartos, ANL
J. Wozniak, ANL
M. Hennebry, ANL

Celebrating the U.S. Constitution Bicentennial — 1787-1987

CERL 200 K

Provisions for IPA's

3500 Missing

HSC
AEHA

The following literature is in reference to:

Project #	Project Title
66	Preparation of MDI and Update

Military Item Disposal Instructions (MIDI) Database. The U.S. Army Environmental Hygiene Agency (AEHA) has produced a CD-ROM (Compact Disc - Read-Only Memory) disc containing disposal guidance and other environmental information. Information on the disc includes the MIDI database (Military Item Disposal Instructions), Department of Transportation Emergency Response Guides, AEHA Fact Sheets, and Commanders Guides to Hazardous Waste Minimization and Infectious Waste Management. The CD-ROM also includes ASCII and WordPerfect v5.0 files of the AEHA Technical Guide 126 (TG-126, Waste Disposal Instructions) and the Health Services Command (HSC) Model Medical Waste Regulation.

Military Item Disposal Instructions

The MIDI CD-ROM system is a database application designed to provide methods of destruction for the disposal of hazardous and nonhazardous items used within the Department of Defense (DoD). The MIDI system aids the preventive medicine officer and the logistician in proper disposal of outdated medical and non-medical items. The database also serves the Defense Reutilization and Marketing Service in their disposal mission.

The information in the MIDI system provides guidance for safe and proper disposal of outdated items. The disposal of chemicals and medical items must meet requirements set forth by the Environmental Protection Agency (EPA) and state environmental agencies. The use of appropriate disposal methods is essential to the safety of personnel handling and disposing of these items. Many items and chemicals used within the DoD pose risks to both personal safety and the environment. The MIDI database contain information from the product Material Safety Data Sheet (MSDS) for many items used in the DoD.

The MIDI database has historically concentrated on medical items. NSN's (National Stock Numbers) in the 6500 series make up approximately 80% of the total number of NSN's in the database (~47,000), and NSN's in the 6800 series make up about half the remaining items (approximately 8% of the total). Updates to the MIDI system will add disposal guidance for additional non-medical items, eventually including all hazardous items in the supply system.

The database may be searched on individual data fields, combinations of data fields (using "AND"/"OR" connectors), or the entire database. The search and retrieval software used in the MIDI CD-ROM system is the same used by the HMIS (Hazardous Materials Information System) CD-ROM from the Defense General Supply Center. Context sensitive help is available for most screens and data fields, and drop down menus provide access to the various user functions available. Users familiar with the HMIS CD-ROM will appreciate the consistent user interface in the MIDI CD-ROM.

1989 Project Costs: $136,984.50
1991 Project Costs: $ 97,130.52

HSC
Fitzsimmons AMC

The following literature is in reference to:

Project #	Project Title
67	Laboratory Solvent Recycling

#67

HSHG-EH (200)
22 Apr 92

INFORMATION PAPER

SUBJECT: Hazardous Waste Minimization Projects

1. Issue. To provide information about the Fitzsimons Army Medical Center (FAMC) Hazardous Waste Minimization Program.

2. Facts.

a. An aggressive recycling program for used solvents at the FAMC medical facilities has been initiated. Xylene, ethanol, methyl alcohol, and formalin recycling systems have been purchased. The following is a table of the recycling systems status:

STATUS OF RECYCLING SYSTEMS

SOLVENT	COST OF RECYCLING SYSTEM	ANNUAL SAVINGS	# OF YEARS FOR PAYBACK	DATE OF IMPLEMENTATION
Xylene/ Ethanol	$15,000	$11,000	1.36	October 1990
Formalin	$13,000	$8,980	1.25	December 1991
Methyl Alcohol	$18,000	$10,275	1.75	October 1992

b. When all recycling systems are implemented, the reduction of hazardous wastes for the FAMC medical facilities will be approximately 80 percent.

Ms. Errett/3526

NGB
AV MSARNG

The following literature is in reference to:

Project #	Project Title
70	Purchase/Install PMB Equipment

#70

COST REDUCTION

1. (A.) Cost per acft for the chemical stripper. 70 gals cost $600.00.

   (B.) Cost per acft for the Plastic Media Blast $1.58 per lb. 120 lbs of waste total cost of waste $189.60.

2. (A.) Cost per acft for Hazardous waste removal for chemical stripping $3100.00.

   (B.) Cost per acft for P.M.B. stripping waste removal $00.00. P.M.B. waste is SAFE to put into the LANDFILL.

3. (A.) Manhours to prep and strip by chemical — Prep 36, Strip 48 = 84

   (B.) Manhours to prep and strip by P.M.B. — Prep 72, Strip 24 = 96

4. (A.) Manhours to clean-up after chemical strip 128.

   (B.) Manhours to clean-up after P.M.B. 128.

5. (A.) Cost per acft for solvents to clean-up after chemical stripping Acetone $26.42 per gal. 35 gals at a cost of $924.00.

   (B.) Cost per acft for solvents to clean-up after P.M.B. stripping Acetone $26.42 per gal. 1 gal at a cost of $26.42.

6. Converting to the High Velocity Low Pressure gun will save 1 gal of paint per acft at a cost of $48.00 per 1 gal kit.

7. Paint Booth Maintenance cost of using HVLP will be lowered by an estimated $300.00 per year in floor protection and paint filters.

8. Replaced MEK and Acetone with Lacquer thinner when feasible. MEK costs $23.70 per gal. Acetone costs $26.42 per gal. Lacquer thinner costs $8.00 per gal with a savings of $125.60 per acft.

These estimates are based on UH-1H helicoptes.

Prep, Strip and Cleaning.

Chemical	P.M.B.
212 hrs	224 hrs
$4624.00	$216.02

3 May 1993

MS AVCRAD WASTE MINIMIZATION PROJECTS

Information Paper

The Plastic Media Blasting (PMB) System for aircraft stripping was completed for operation in July 1992. This eliminated all chemical stripping on aircraft and components. This resulted in a tremendous hazardous waste savings/reduction.

Waste Paint Stripper	80,000 gls
Disposal Cost	$140,000.00

Paint mixing procedures is monitored to ensure excess paint is not mixed. This procedure is six months into operation.

Quantity	20 gls
Cost Savings	$837.60

Paper utilized for table covering to paint component parts is now used several times.

Quantity (54 lb per roll)	5 rolls
Cost Savings	$129.18

Paint gun lines are cleaned with an improved line cleaner method to reduce solvent waste. This procedure started last quarter ~~by~~ of 1991.

Quantity	416 gls
Cost Savings	$10,990.00

Paint parts with excess paint from aircraft painting, also batch parts to justify mixing a paint kit. Procedure put into operation 1992.

Quantity	60 gls
Cost Savings	$2932.00

Eliminated excess tape usage when preparing aircraft for stripping and painting.

Quantity	60 rolls
Cost Savings	$340.80

Paint operation converted to a High Velocity Low Pressure (HVLP) Spray Gun that will result in a significant savings.

Quantity	100 gls
Projected 93 Cost Savings	$4188.00

The paint operation is continuing to reduce hazardous materials usage by substituting acetone for all tasks that do not specifically call for Methyl Ethyl Keytone (MEK). This procedure was stated in 1991.

<u>MEK used 1991</u>	<u>Acetone used 1991</u>
Quantity - 1930 gls	Quantity - 660 gls
Cost - $45,741.00	Cost - $17,424.00
<u>MEK used 1992</u>	<u>Acetone used 1992</u>
Quantity - 650 gls	Quantity - 495 gls
Cost - $15,405.00	Cost - $13.077.00

<u>Cost Savings</u>

<u>MEK</u>	<u>Acetone</u>
Quantity - 1280 gls	Quantity - 165 gls
Cost - $30,336.00	Cost - $4,347.00

The paint operation is in the process of replacing Acetone $26.43 gl and MEK $23.70 gl with a dope and lacquer thinner $8.00 gl where possible.

Aircraft Component Repair Section eliminated trichlorotriflouroethane (freon) for parts cleaning. Cleaning Solvent PD 680 Type II is now used in place of freon. This was accomplished January 1992.

Quantity Eliminated	800 gls
Cost Savings	$23,998.00

A filter system was purchased, March 1991, and utilized by all maintenance sections to reduce PD 680 Type II cleaning solvent used in parts cleaning tanks. This eliminated the requirement to change solvent on a 90 day schedule. Solvent is now used a minimum of one year

Quantity Reduced	500 gls
Cost Savings	$1,400.00

Cleaning Solvent PD 680 Type II is no longer used on the washrack since November 1991. A biodegradable solvent is now used, resulting in no significant monetary savings.

Quantity Reduced	300 gls

SOLID WASTE MINIMIZATION

Solid Waste Streams	lbs per wk	Landfill	Recycle
1. Bond Paper	40		X
2. Computer Paper	30		X
3. Paper Mixed Scrap	40		X
4. Cardboard	200		X
5. Aluminum Cans	40		X

SOLID WASTE LANDFILL

1991 - 60 Tons

1992 - 56 Tons

Approximately 10% Reduction

TRADOC
Ft. Eustis

The following literature is in reference to:

Project #	Project Title
72	Fuel Tank Purge Study
73	Oil Vacuum Truck

72,73

DIRECTORATE OF ENGINEERING AND HOUSING
U. S. ARMY TRANSPORTATION CENTER
FORT EUSTIS, VIRGINIA 23604-5306

FACSIMILE HEADER SHEET

PRIORITY ( ) ROUTINE (✓)	NAME OFFICE OFFICE SYMBOL	TELEPHONE NUMBER	FAX NUMBER
FROM: DEH Ft. Eustis	Damon Doumlele ATZF-EHE	AVN 927-4123 COMM (804) 878-4123	(804) 888-0171
TO: Arthur D. Little	Colette Lamontagne	AVN COMM (617) 498-5377	(617) 498-7221

NO OF PAGES (INCLUDING HEADER)	DAY	MON	YR.
5	3	Feb	93

REMARKS: Summary/conclusions/ recommendations from ~~for~~ the tanker purging study

RELEASER'S SIGNATURE: Damon J. Doumlele

TITLE: ______

EXECUTIVE SUMMARY

The 549th Transportation Company at Fort Story, Virginia, currently transports JP-4, JP-5, AVGAS, MOGAS, and diesel fuel. The company operates a fleet of seven tankers. Each tanker is normally dedicated to one type of fuel. Approximately five times per year it is necessary to change the type of fuel transported because of equipment breakdowns and operational requirements. To prevent cross-contamination, the tankers are purged to remove the old fuel. Purging is performed by flushing the tanker with water; this results in a fuel-contaminated water waste. The company currently cannot dispose of purging wastes and has been storing these wastes in the tankers, reducing the effective strength of the company.

The purpose of this project is to develop and evaluate techniques for purging fuel tankers that minimize the volume of wastes generated and to evaluate techniques to recycle, treat, and dispose of purging wastes. The approach taken in this project was to visit Fort Story and interview company personnel to define purging requirements and company constraints. Other military installations, federal agencies, and private industries were then contacted to identify potentially relevant techniques used at their locations.

Hazardous Waste Minimization (HAZMIN) techniques were combined with alternatives for minimizing the frequency of purging, offsite purging, onsite purging, and waste treatment. Alternatives were then evaluated on the basis of their applicability to operations at Fort Story, their technical effectiveness, their cost, and safety considerations.

The alternatives that were evaluated included obtaining additional tankers; minimizing the frequency of purging; offsite purging using contractors or fuel suppliers; and conducting onsite purging by using new fuel, steam cleaners, or high-pressure hot-water (HPHW) washers. The waste treatment alternatives evaluated included recycling the generated waste as a supplemental fuel, purchasing a dedicated system, and using a contractor to dispose of the waste.

On the basis of the information collected, it was concluded that the cost of obtaining additional tankers ($125,000 to $145,000/tanker) or purchasing a dedicated waste treatment system ($6,000 to $13,500) was not justified by the low frequency of purging. It was also concluded that onsite alternatives that require tanker entry are not justified because of the cost of training and equipping the company in those procedures ($8,000 to $10,000). However, this training may be needed if it is decided that for operational reasons the company should maintain this capability. Finally, the

potential for the company to be allowed to dispose of purging wastes at onsite treatment facilities is limited because these facilities are not effective in treating this type of waste.

Recommendations were made to minimize or suspend purging during fuel changes by dedicating tankers to similar fuel types. The use of offsite contract cleaning firms for purging was recommended because of the low frequency of purging and the low cost and easy implementation of this alternative ($100/purge, or approximately $500/year). Although onsite purging is not recommended, the use of new fuel for purging or an HPHW washer is recommended to minimize the volume generated, if this alternative is selected. The waste generated from onsite purging should be recycled as supplemental boiler fuel or disposed by a contractor ($2,000 to $15,000/year).

WDR328/028

Section 5
CONCLUSIONS AND RECOMMENDATIONS

Information from site visits and interviews was used to identify the purging requirements and constraints of the 549th Transportation Company. Recommendations for further consideration and implementation were then developed on the basis of the evaluation of HAZMIN techniques.

CONCLUSIONS

The following conclusions are based on information obtained during site visits/interviews, and information contacts:

- Purging is required approximately five times per year because of changes in the type of fuel transported by individual tankers. This frequency does not justify the high capital cost of obtaining additional tankers.

- The 549th Transportation Company is not equipped or trained for onsite purging techniques that require tanker entry.

- The potential to resume disposal of purging wastes at the LARC-60 or Fort Eustis 3rd Port Oil/Water Separator is limited because neither facility is designed for treatment of fuel-contaminated wastes. The purchase of a dedicated waste treatment unit is not justified by the frequency of purging.

- Offsite purging by local contractors is a viable alternative practiced by other military installations in the Norfolk area.

RECOMMENDATIONS

The following alternatives are recommended for further consideration and implementation:

- Minimize the need for purging between fuel changes by restricting tankers to carrying similar types of fuels. Consider suspending purging based on the potential impact of cross-contaminated fuels on the vehicles serviced.

- Have purging performed offsite by a contractor. The cost of contractor purging is estimated at $100 per purge. Because of the limited frequency of purging, this option is most economically attractive and eliminates the need for Fort Story to dispose of purging wastes. This option is also favored by battalion personnel.

- If onsite purging is selected, consider the use of the new fuel as a purging fluid.

- The use of water for purging is not recommended because of the cost of disposal and the need to train and equip company personnel in safety procedures. However, if water is used for purging, the use of an HPHW washer is recommended because of the limited volume of waste generated by this equipment.

- Wastes generated by onsite purging should be recycled as supplemental boiler fuel or disposed by a hazardous waste contractor via the DRMO. The volume of waste generated should be minimized as previously discussed.

WDR328/029

DIRECTORATE OF ENGINEERING AND HOUSING
U. S. ARMY TRANSPORTATION CENTER
FORT EUSTIS, VIRGINIA 23604-5306

FACSIMILE HEADER SHEET

PRIORITY ( ) ROUTINE ( )	NAME OFFICE OFFICE SYMBOL	TELEPHONE NUMBER	FAX NUMBER
FROM:	ATZF-EHW David T. Sills	AVN 927-3754 COMM 878-3754	888-0171
TO:	Colette Lamontagne Co. ATTN: Aurther D Little	AVN COMM	617 498 7221

NO OF PAGES (INCLUDING HEADER)	DAY	MON	YR	REMARKS:
2	8	Feb	93	

RELEASER'S SIGNATURE: David Sills

TITLE: Clsant Sec

72, 73

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ACCT. #

TO: FORT EUSTIS DEPARTMENT OF SANITATION
ATZ-EHW BLDG. 1615
FORT EUSTIS, VA. Zip Code 23604

ATTN: DAVID SILLS
TEL: 1-(804) 878-3754 Ext.
DATE: 16 AUGUST 1989

P.O. #

EQUIPMENT DESCRIPTION

VACUUM ☑	INDUSTRIAL ☐	D.O.T. CERTIFIED ☐	DUMPER ☐
VACUUM-JET ☐	SEPTIC TANK ☑	NON-D.O.T. ☑	NON-DUMPER ☑

REMARKS	No.	TRUCK/TRAILER
	1	LELY Truck ☑ Customer's Truck ☐
KODIAK	2	YR 89 Make CHEV Model C70042
CAB	3	Engine 3208 CAT Diesel ☑ Gas ☐
WHITE	4	Transmission 6 SPEED FULLER
	5	Brakes: Air ☑ Hydraulic ☐
	6	GVWR 30200 C.A. 125"
	7	~~Trailer Length~~ ALL WEATHER TIRES REAR
		TANK
	8	Total Capacity 2300 GALLON
	9	Dia 66 Length 144" SHELL 164" OL
	10	Baffle(s) TWO
	11	Top Manhole(s) 3" 4" 6" 20" 24" 36"
	12	Sight Glasses: Three 2" 5" Dia.
	13	Mechanical Liquid Level Indicator
	14	Intake Assembly 3" 4" 6" F.L. ☐ T.F. ☐
	15	Discharge Assembly 3" 4" 6" Air ☐ Elec. ☐
	16	Valve Reducer Assembly 4" X 3"
	17	Valve Cplgs: Al ☑ Brass ☐ S. Steel ☐
	18	Suction Boom: 4" 6": Hyd. ☐ Spring ☐
	19	Tank Mtd. Decking STD. ☐ H.D. ☐ Dia. ☐
1/16"	20	Frame Mtd. Decking [redacted] H.D. ☑ Dia. ☐
	21	Rear Floodlight
	22	Running Lights (Vapor Proof)
	23	Beacon Warning Light
	24	Tool Box: 36" x 22" x 22"
	25	Intake Wear Plate
	26	Rear Manhole 20" 24" 36" Full Dia. ☐
	27	Rear Bumper DOT ☐ Brace ☑ Rack ☐
		VACUUM/PRESSURE SYSTEM
ASPORT	28	Pump Model H15 WV 314 CFM
	29	Drive: PTO - Belt ☑ Hydraulic ☐ Gearbox ☐
	30	PTO Control: Air Shift ☐ STD. ☑
	31	PTO Drive Shaft: H.D. ☐ STD. ☑
	32	Engine RPM Control (Pump Speed) STD. ☑
ASPORT	33	Auxiliary Engine: Diesel ☐ Gas ☐
2004	34	Internal Shut-Off: H.D. ☐ STD. ☑ 3"
153	35	Secondary Shut-Off: H.D. ☐ STD. ☑ 3"
5453	36	Pump Muffler. H.D. ☐ STD. ☑ 3"
	37	Pressure Relief Valve ☑ Vacuum ☑
	38	Vacuum/Pressure Gauge

No.	HYDRAULIC DUMPING SYSTEM
40	Hoist 14T 18T 25T 30T
41	Full Dia. Hydraulic Rear Door
42	PTO Control: Air Shift ☐ Std ☐
43	Non-Disconnect Tank Hoses
44	Front Disconnect Tank Hoses
45	Hydraulic or Electric Vibrator
	HIGH PRESSURE WATER SYSTEMS
47	Tank-Within-Tank Capacity
48	Length (Seam-To-Seam)
49	Auxiliary 80 Gallon Water Tank
50	GEM-JET System (½" Dia Hose)
51	PSI GPM
52	Hose Length
53	Drive: PTO ☐ HYD. ☐ Diesel/Gas Engine ☐
	TANK FINISH
54	Sandblasting. Exterior ☑ Interior ☐
55	Interior. Epoxy Primer ☑ Coal Tar ☐
56	Exterior. One Color ☑ Two Color ☐
57	Paint Type ACRYLIC Color Code
58	Mounting and Testing
	ACCESSORIES
59	Anti-Static Grounding Reel & Connections
60	Back-Up Alarm
61	Suction Hoses: No. 2 Dia. 4" Length 20' WITH COUPLINGS

PRICES, TERMS, DELIVERY

Equipment Price	$15,598.00
Chassis Price (if applicable)	27,843.00
Taxes (if applicable)	N/A
Total Price	$43,441.00
Terms	GOVT # P.O.
Delivery	NET DUE 30 DAYS
F.O.B.	LELY CORPORATION Wilson, N.C. F.O.B. FORT EUSTIS, VA.
PER	

NOTES

1989 CHEVROLET KODIAC CAB WITH 3208 CATIPILLAR DIESEL ENGINE
ADDITIONAL SPECIFICATIONS ON CHASSIS:
12,000 LB FRONT AXLE 12,000 LBS SPRINGS & SHOCKS